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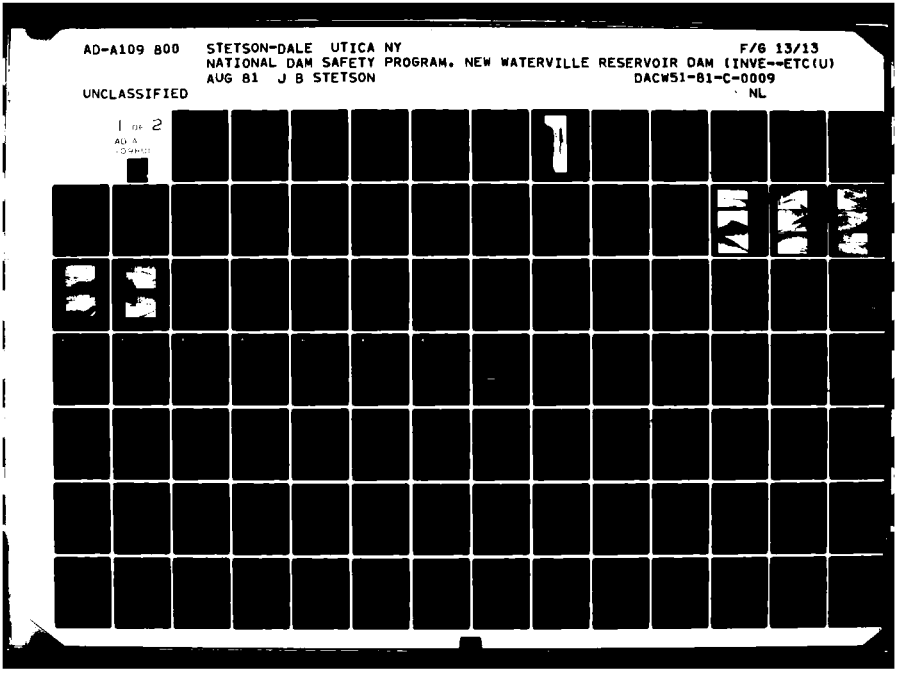

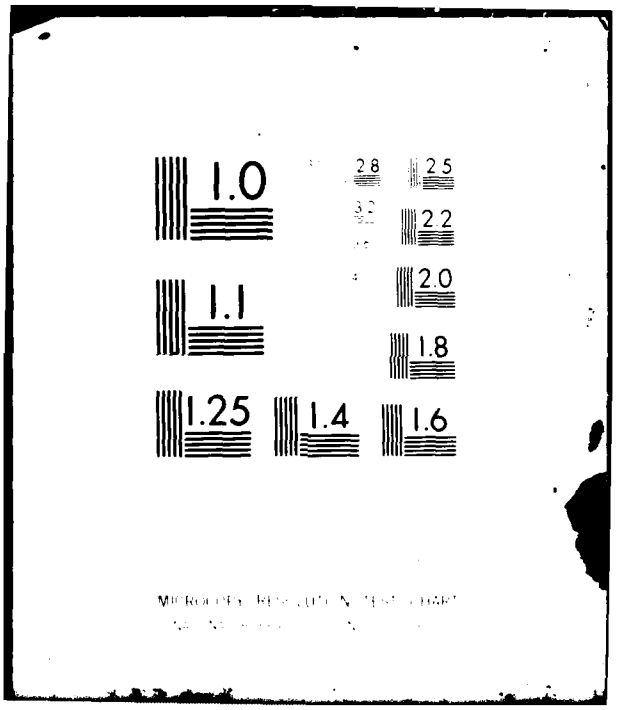
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MOHAWK RIVER BASIN

LEVEL II

(3)

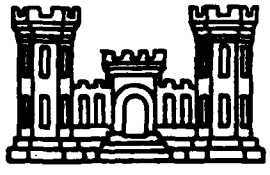
NEW WATERVILLE RESERVOIR DAM

NEW YORK

INVENTORY No. NY 195

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM



NEW YORK DISTRICT CORPS OF ENGINEERS

AUGUST 1981

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New Waterville Reservoir Dam
Mohak River Basin
Oneida County

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization.

The Phase I inspection of the New Waterville Reservoir did not indicate conditions which would constitute an immediate hazard to human life or property.

cont

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

The hydrologic/hydraulic analysis establishes the spillway capacity as 30 percent of the Probable Maximum Flood (PMF). The dam will be overtopped by 0.6 feet by the PMF and 0.3 feet under the 1/2 PMF. However, an analysis of a failure of the dam under the 1/2 PMF indicates that the downstream hazard to loss of life will not be significantly increased from that which would occur just prior to a dam failure. Therefore, the spillway is assessed as inadequate according to the Corps of Engineers' screening criteria.

An investigation should be started within 3 months to determine the source of the seepage near the toe of the embankment at the left of the gatehouse. Remedial work should be undertaken depending on the results of this investigation. This work should be completed within 18 months.

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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APPENDIX

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

Name of Dam:	New Waterville Reservoir I.D. NO. NY 195
State Located:	New York
County:	Oneida
Watershed:	Mohawk River Basin
Stream:	Blair Brook
Date of Inspection:	March 13, 1981 and April 10, 1981

ASSESSMENT OF GENERAL CONDITIONS

The Phase I inspection of the New Waterville Reservoir did not indicate conditions which would constitute an immediate hazard to human life or property.

The hydrologic/hydraulic analysis establishes the spillway capacity as 30 percent of the Probable Maximum Flood (PMF). The dam will be overtopped by 0.6 feet by the PMF and 0.3 feet under the 1/2 PMF. However, an analysis of a failure of the dam under the 1/2 PMF indicates that the downstream hazard to loss of life will not be significantly increased from that which would occur just prior to a dam failure. Therefore, the spillway is assessed as inadequate according to the Corps of Engineers' screening criteria.

An investigation should be started within 3 months to determine the source of the seepage near the toe of the embankment at the left of the gatehouse. Remedial work should be undertaken depending on the results of this investigation. This work should be completed within 18 months.

The following remedial work should be undertaken during normal maintenance operations within one year:

1. Woodchuck burrows should be filled in and the rodents eliminated from the facility.

2. Trees and brush on the slope should be removed and a sod cover established to allow for easy inspection of the embankment.

3. A flood warning and emergency evacuation system should be implemented to alert the public in the event conditions occur which could result in failure of the dam.

4. A formalized inspection system should be initiated to develop data on conditions and maintenance operations at the facility.

Dale Engineering Company

John B. Stetson, President

Approved By: Richard E. Mayo, for
Col. W. M. Smith, Jr.
New York District Engineer

Date: 10 Feb 81

1. Overview of New Waterville Reservoir and crest of dam. Principal spillway structure at far end of embankment in left portion of photo.

PHASE I INSPECTION REPORT
NEW WATERVILLE RESERVOIR DAM I.D. NO. NY 195
MOHAWK RIVER BASIN
ONEIDA COUNTY, NEW YORK

SECTION 1: PROJECT INFORMATION

1.1 GENERAL

a. Authority

Authority for this report is provided by the National Dam Inspection Act, Public Law 92-367 of 1972. It has been prepared in accordance with a contract for professional services between Dale Engineering Company and the U.S. Army Corps of Engineers.

b. Purpose of Inspection

The purpose of this inspection is to evaluate the existing conditions of the New Waterville Reservoir Dam and appurtenant structures, owned by the Village of Waterville, New York, and to determine if the dam constitutes a hazard to human life or property and to transmit findings to the U.S. Army Corps of Engineers.

This Phase I inspection report does not relieve an Owner or Operator of a dam of the legal duties, obligations or liabilities associated with the ownership or operation of the dam. In addition, due to the limited scope of services for these Phase I investigations, the investigators had to rely upon the data furnished to them. Therefore, this investigation is limited to visual inspection, review of data prepared by others, and simplified hydrologic, hydraulic and structural stability evaluations where appropriate. The investigators do not assume responsibility for defects or deficiencies in the dam or in the data provided.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances

The New Waterville Reservoir Dam is located in the Town of Sangerfield, approximately 2-1/4 miles east of Waterville. The dam consists of an earthen embankment 520 feet long with a maximum height of approximately 45 feet. The service spillway of the dam is located near the right abutment. The upstream slope of the embankment is at a slope of 2 horizontal to 1 vertical. The area at the waterline is protected by concrete slabs. The downstream slope of the embankment is 1-3/4 horizontal to 1 vertical. The crest of the dam is 15 feet wide. The plans indicate a concrete core wall extending from 2-1/2 feet below the crest of the dam into rock or "other suitable material." The service spillway is a broad crested weir 15 feet wide which overflows into a side channel spillway which outlets through a 24 inch cast iron pipe to a pool downstream from the dam. The spillway is equipped with a trash rack to prevent clogging of the discharge pipe. An emergency spillway is located near the left

abutment of the dam. It consists of a 21 foot 8 inch wide broad crested weir which discharges through an open channel cut in original ground to a point beyond the toe of the dam. The facility provides water supply to the Village of Waterville through a 12 inch cast iron water main which runs to a valve house just below the toe of the center of the dam. This line is reduced to a 6 inch transmission main to the Village. A 12 inch diameter cast iron drain line also terminates at the valve house and discharges just below the toe of the dam. The watershed for this facility is undeveloped forest land.

b. Location

The New Waterville Reservoir Dam is located in the Town of Sangerfield, Oneida County, New York.

c. Size Classification

The maximum height of the dam is approximately 45 feet. The volume of the impoundment is approximately 95 acre feet to the top of dam. Therefore, the dam is in the intermediate size category as defined in the Recommended Guidelines for Safety Inspection of Dams.

d. Hazard Classification

The impoundment discharges through a steep sided ravine. Farm homes are located near the stream approximately 1/2 mile downstream from the dam. Therefore, the dam is in the high hazard classification as defined in the Recommended Guidelines for Safety Inspection of Dams.

e. Ownership

The dam is owned by the Village of Waterville, New York.

Contact: Clerk Treasurer
Village of Waterville
Village Hall
214 White Street
Waterville, New York 13480
Telephone: (315) 841-4221

f. Purpose of the Dam

The dam is used as a water supply source for the Public Water System of the Village of Waterville.

g. Design and Construction History

The plans included in this report bear the date of 1906. It is assumed that the dam was built shortly thereafter. No record of modifications to the structure have been discovered.

h. Normal Operational Procedures

Water from the impoundment is fed to the Village of Waterville to meet the demand of the supply system. Excess flows are allowed to discharge through the service spillway. The facility is visited approximately every 2 weeks. Slopes are mowed approximately every 2 years.

1.3 PERTINENT DATA

a. Drainage Area

The drainage area of the New Waterville Reservoir Dam is 0.38 square miles.

b. Discharge at Dam Site

No discharge records are available for this site.

Computed discharges:

Service spillway, top of dam	51 cfs
Ungated emergency spillway, top of dam	255 cfs
Reservoir drain capacity *	14 cfs

c. Elevation (feet above MSL) (estimated from USGS mapping)

Top of dam	1,510
Service spillway crest	1,506
Emergency spillway crest	1,507.33
Stream bed at centerline of dam	1,465

d. Reservoir

Length of normal pool	625 feet

e. Storage

Top of dam	95 acre feet
Normal pool (@ service spillway crest)	68 acre feet

f. Reservoir Area

Top of dam	7.4 acres
Normal pool (at service spillway crest)	5.8 acres
Emergency spillway pool	6.5 acres

g. Dam

Type - earth fill
Length - 520 feet
Height - 45 feet
Freeboard between normal reservoir and top of dam - 4 feet

* 12-inch drain with the reservoir at service spillway crest.

Top width - 15 feet
Side slopes- Upstream: 2 horizontal: 1 vertical
Downstream: 1-3/4 horizontal: 1 vertical
Zoning - None
Impervious core - concrete corewall
Grout Curtain - None

h. Spillway - Emergency

Type - Broad crested weir
Length - 21 feet- 8 inches
Crest elevation - 1507.33
Gates - None
U/S Channel - Impoundment
D/S Channel - Channel in original ground

Spillway - Service

Type - Broad crested weir
Length - 15 feet
Crest elevation - 1,506
Gates - None
U/S Channel - Impoundment
D/S Channel - 24-inch cast iron pipe

i. Regulating Outlets

12-inch drain line.

SECTION 2: ENGINEERING DATA

2.1 GEOTECHNICAL DATA

a. Geology

The New Waterville Reservoir Dam is located in the Southern New York section of the Appalachian Plateaus Province. It is part of the Appalachian Highlands, the major physiographic division.

Bedrock in the site area is the Marcellus Formation which is part of the Hamilton Group of Middle Devonian age. The formation is composed of medium-gray shaly claystone with some layers of siltstone. The claystone is fissile and deteriorates easily when exposed. Outcrops of the shale are present beyond the dam toe immediately across the stream at the approximate center of the dam and at the south end of the dam, on the ridge, opposite the dam toe. The area appears to have a glacial till cover; there were no exposures.

b. Subsurface Investigations

The 1906 plan indicates that the bottom of the concrete core wall was to go to rock or other satisfactory surface. The 1917 report indicates that the foundation bed is on gravel and earth which in this area would imply a glacial till as the foundation bed.

The 1917 State report (see Appendix E) indicates "dam fill of gravel and crushed stone".

2.2 DESIGN RECORDS

No reports were available from the original design of the dam. The construction plans are included in Appendix F.

2.3 CONSTRUCTION RECORDS

No records were available regarding the original construction of the dam.

2.4 OPERATIONAL RECORDS

There are no operational records available for this dam.

2.5 EVALUATION OF DATA

The data presented in this report was obtained from the Department of Environmental Conservation files and from the Village of Waterville, Department of Public Works. The information available appears to be reliable and adequate for a Phase I inspection report.

SECTION 3: VISUAL INSPECTION

3.1 FINDINGS

a. General

The New Waterville Reservoir dam was inspected on March 13, 1981 and on April 10, 1981. Snow conditions during the March 13 inspection prevented a complete inspection of the dam. The Dale Engineering Company Inspection Team was accompanied on the inspections by Gene Ostrander and Jack Youngs of the Village of Waterville Department of Public Works.

b. Dam

At the time of the inspection, the water level in the impoundment was at the elevation of the service spillway. The crest of the dam was uniform and no evidence of settlement was detected. The crest of the dam showed evidence of vehicular traffic due to ruts running longitudinally along the crest of the dam. A small ditch approximately 15 inches deep had been excavated across the crest of the spillway near the center of the dam to accommodate hoses which were used to siphon water from the impoundment during the cleaning operations in the summer of 1980. The right abutment of the downstream slope showed no signs of erosion or seepage. Seepage and minor sloughing was detected in the original ground to the right of the gatehouse which is situated at the toe of the dam near the center. A significant area of seepage was detected at the toe of slope of the embankment to the left of the gatehouse. Seepage was also detected in this area below the toe of slope. The area of seepage covers a distance of approximately 100 feet along the toe of the slope and into the left abutment. The seepage area covers a height of approximately 15 feet above the toe of slope. Flowing water was detected at the interface between the toe of slope and the original ground which formed the left bank of the original streambed. The water in this area showed the orange deposits of iron oxide. The surface in the area was soft and easily penetrated to a depth of 1 foot with little resistance. The slopes in the area were uniform and showed no signs of sloughing or movement. The downstream slope of the dam is uniform and no sloughing or depressions were detected. The slope is covered with a light brush cover. Some stumps of previously cut trees or brush approximately 3 inch in diameter were found. The light brush cover indicates that the slope is mowed infrequently. A few woodchuck burrows were detected in the downstream slope at an elelvation approximately 5 feet above the area where seepage was detected. The upstream slope of the impoundment is protected by concrete slabs at the waterline. This slope protection is in good condition and effectively prohibits erosion at the waterline. Some light brush was found at the top of the upstream slope.

c. Service Spillway

The service spillway situated near the right abutment is in operating condition and only a small amount of debris was lodged on the trash racks.

The discharge pipe which carries flow from this spillway is free and operating properly.

d. Emergency Spillway

The emergency spillway located near the left abutment is clear and in operating condition. The facility shows no evidence of flow having occurred through this spillway. The channel downstream from the emergency spillway discharges into the original receiving stream beyond the toe of slope of the dam. No signs of recent erosion were detected in the spillway channel.

e. Appurtenant Structures

The gatehouse at the toe of the slope was in operating condition during the summer of 1980 when the impoundment was cleaned of sediment.

f. Control Outlet

The outlet of the impoundment consists of a 12 inch pipe which terminates at the gatehouse. This line was in operating condition at the time the impoundment was drained.

g. Reservoir Area

The reservoir covers approximately 5.8 acres. Slopes into the impoundment are gradual and no evidence of slope instability was detected.

h. Downstream Channel

The downstream channel of this facility is open and allows free flow of the overflow.

3.2 EVALUATION

The visual inspection indicates that the following specific items should be addressed by the Owner:

1. A considerable area of seepage exists near the center of the dam at an elevation approximately 15 feet above the toe. Seepage was also found in the original ground beyond the toe of the dam.

2. Woodchuck burrows were found to exist on the exterior slope of the embankment.

3. The slope of the embankment is overgrown with trees and brush.

SECTION 4: OPERATION AND MAINTANENCE PROCEDURES

4.1 PROCEDURES

This reservoir is used to provide water supply to the Village of Waterville. Water is fed through the transmission lines to meet the demand of the Village water supply. Excess flow discharges through the service spillway at the right abutment.

4.2 MAINTENANCE OF THE DAM

Maintenance and operation of the dam is controlled by the Village of Waterville. The facility is visited approximately every 2 weeks but no formal operating or reporting system is in effect at the site. The downstream slope of the embankment is cleared of brush approximately every 2 years. Growth on the site indicates that the brush was not removed last year.

4.3 MAINTENANCE OF OPERATION FACILITIES

The valves controlling flow into the Village water system are in operating condition.

4.4 DESCRIPTION OF WARNING SYSTEM

No warning system is in effect at present.

4.5 EVAULATION

The dam and appurtenances are periodically inspected by representatives of the Village of Waterville.

1. Since this dam is in the high hazard classification, a warning system should be implemented to alert the public should conditions occur which could result in failure of the dam.

2. A formalized inspection system should be initiated to develop data on the conditions and maintenance operations at the facility; specifically, data should be collected and recorded regarding the amount of flow which occurs from the area of seepage.

SECTION 5: HYDROLOGIC/HYDRAULIC

5.1 DRAINAGE AREA CHARACTERISTICS

The New Waterville Reservoir Dam is located in the Town of Sangerfield, east of the Village of Waterville. The dam has a drainage area of 0.38 square miles, which is characterized by moderately steep to steeply sloping hills. The watershed is essentially undeveloped and wooded. The reservoir has a surface area of approximately 5.8 acres and outlets into Blair Brook, which is a tributary of Oriskany Creek.

5.2 ANALYSIS CRITERIA

The purpose of this investigation is to evaluate the dam and spillway with respect to their flood control potential and adequacy. This has been assessed through the evaluation of the Probable Maximum Flood (PMF) for the watershed and the subsequent routing of the flood through the reservoir and the dam's spillway system. The PMF event is that hypothetical flow induced by the most critical combination of precipitation, minimum infiltration loss and concentration of run-off of a specific location that is considered reasonably possible for a particular drainage area.

The hydrologic analysis was performed using the unit hydrograph method to develop the flood hydrograph. Due to the limited scope of this Phase I investigation, certain assumptions, based on experience and existing data were used in this analysis and in the determination of the dam's spillway capacity to pass the PMF. In the event that the dam could not pass 1/2 the Probable Maximum Flood without overtopping, additional analyses are to be performed on potential dam failures if the dam is designated as a High Hazard Classification. This process was done with the concept that if the dam was unable to satisfy this criteria, further refined hydrologic investigations would be required.

The U.S. Army Corps of Engineers' Hydrologic Engineering Center's Computer Program HEC-1 DB using the Modified Puls Method of flood routing was used to evaluate the dam, spillway capacity, and downstream hazard.

Unit hydrographs were defined by Snyder coefficients, C_t and C_p. Snyder's C_t was estimated to be 2.0 for the drainage area and C_p was estimated to be 0.625. In this analysis, the reservoir pool was assumed to be at the emergency spillway crest elevation at the start of the storm and flow through the service spillway and water transmission system was neglected.

The Probable Maximum Precipitation (PMP) was 19.8 inches according to Hydrometeorological Report (HMR #33) for a 24-hour duration storm, 200 square mile basin. Loss rates of 1.0 inch initial loss and 0.1 inch/hour constant loss were used. These assumptions yielded 84 percent run-off from the PMF. The peak for the PMF inflow hydrograph was 981 cfs and the 1/2 PMF inflow peak was 490 cfs. The small storage capacity of the reservoir above the spillway crest reduced these peak flows a negligible amount.

5.3 EMERGENCY SPILLWAY CAPACITY

The emergency spillway weir is trapezoidal in profile and rectangular in section with two intermediate piers supporting a wooden bridge that spans the opening. For heights of flow below the low chord of the bridge, weir flow will control. Heights of flow above the low chord of bridge were assumed to produce orifice flow through the bridge opening, while heights of flow above the bridge deck also produced weir flow over the deck. The discharge capacity of the emergency spillway at the top of dam elevation is 255 cfs.

SPILLWAY CAPACITY

Flood	Peak Discharge	Capacity as % of Flood Discharge
PMF	979 cfs	26%
1/2 PMF	489 cfs	52%

The discharge capacity of the principal spillway was not considered in routing flood flows. Under these high flows, debris could easily be passed over the trashrack resulting in blockage of the principal spillway outlet pipe.

5.4 RESERVOIR CAPACITY

The reservoir storage capacity was obtained from the plans included in Appendix G and USGS mapping. The resulting estimates of the reservoir storage capacity are shown below:

Top of Dam	95 Acre Feet
Emergency Spillway Crest	77 Acre Feet

5.5 FLOODS OF RECORD

There is no information on water levels at the dam site.

5.6 OVERTOPPING POTENTIAL

The HEC-1 DB analysis indicates that the dam will be overtopped by floods in excess of 30% of the PMF as follows:

Flood	Peak Inflow, cfs	Peak Outflow, cfs	Maximum Depth over Dam
PMF	981	979	0.29
1/2 PMF	392	391	0.62

A dam break analysis was performed to determine the significance of various dam failures on the downstream hazard. This analysis was performed with the 1/2 PMF assuming the earthen embankment to fail at the maximum elevation resulting from the 1/2 PMF. The various scenarios of dam failure investigated covered a range of both breach sizes and failure times to develop the full breach. The flood elevations, due to various dam failures and the flood elevations that would exist just before the corresponding dam break induced flood wave are shown below. These

flood elevations are compared at the downstream hazard area, where the creek crosses the road 2,200 feet downstream of the dam.

Bottom Width of Breach	Failure Time	FLOOD ELEVATIONS AT DOWNSTREAM HAZARD Just Prior to Dam Break	Due to Dam Break
35 ft.	0.5 hrs.	1411.4	1414.9
35 ft.	2 hrs.	1411.4	1412.9
35 ft.	5 hrs.	1411.4	1412.1
100 ft.	0.5 hrs.	1411.4	1414.9
100 ft.	2 hrs.	1411.4	1413.0
100 ft.	5 hrs.	1411.4	1412.2
150 ft.	0.5 hrs.	1411.4	1414.9
150 ft.	2 hrs.	1411.4	1413.2
150 ft.	5 hrs.	1411.4	1412.2

The above elevations were estimated from USGS quad sheets. These elevations are not exact and their significance is in the difference between the elevations for the flood levels with and without the dam failure. This analysis indicates that the flood heights would be increased from a flood height of 2.4 feet before the dam failure to a range of 3.1 to 5.9 feet due to the dam failure, depending on the particular parameters of the failure. The two residences in this area appear to be sited more than 6 feet above the streambed. Therefore, this flood depth increase would not significantly increase the hazard to loss of life due to a dam failure under this condition.

5.7 EVALUATION

The hydrologic/hydraulic analysis establishes the spillway capacity as 30% of the Probable Maximum Flood (PMF). The dam will be overtopped by 0.6 feet by the PMF and 0.3 feet under the 1/2 PMF. However, failure of the dam during the 1/2 PMF event will not significantly increase the downstream hazard from that which would occur just prior to the dam failure. Therefore, the spillway is assessed as inadequate according to the Corps of Engineers' screening criteria.

SECTION 6: STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

Visual inspection of this earthen embankment and concrete core wall dam indicates no evidence of misalignment, settlement or significent sloughing or erosion which would indicate serious structural movement or a condition of structural distress. However, there does exist evidence that some seepage does occur through or beneath the embankment section, as discussed below.

The downstream slope of the embankment generally is covered with light brush and grasses. Some heavy brush exists on the embankment near the toe, but virtually all of the downstream slope is visually accessible for evaluation. Though the vegetative cover is continuous over the embankment slope, it is not rated as being a dense and heavily rooted cover in regard to resistance against erosive actions. Some animal burrows were noted.

The upper segment of the dam's upstream face is protected with concrete slab sections, which were noted to be in good condition to the depths visible from inspection points on the embankment crest.

Excess reservoir flow is conducted through an overflow chamber (a concrete spillway structure) situated adjacent to the right abutment. This structure is in good condition. Normal reservoir overflow entering the chamber is carried by buried pipe to a point of discharge (into Blair Brook) beyond the downstream toe of the embankment. The emergency spillway, a broad-crested weir with concrete side walls, is located at the left end of the embankment structure. The downstream channel for this spillway follows a path which would discharge overflow below the downstream limit of the embankment structure.

A gatehouse for controlling flow to the Waterville Water Supply is located at the downstream toe of the embankment, near the midlength point.

In regard to indications of through or beneath the dam seepage, several limited areas of sloughing/erosion exist about at and just below the downstream toe of embankment. The more evident zones of such sloughing exist near the center of the embankments length; some ground dampness was observed but no seepage flow was noted. A greater extent of surface dampness exists on the lower half of the slope across approximately the left half of the embankment length. Limited seepage flow was noted at toe of slope approximately at the location where the embankment section meets the abutment topography.

b. Design and Construction Data

Generalized design drawings showing the alignment and cross-section of the embankment and information relating to the overflow chamber and emergency spillway structures are available. Information on records relating to structural design and construction are not available. The drawings

available are shown in Appendix F. The design information indicates this earthern embankment dam, on the order of 520 feet long, is provided with a concrete core wall. The maximum height of the embankment is on the order of 45 feet, with an upstream slope of 2 horizontal to 1 vertical, and a downstream slope of 1.75 horizontal to 1 vertical. Conditions visible at the time of the inspection indicate the dam, including the abutments, is in general conformance with the information indicated by the available drawings.

c. Operating Records

There are no operating records available for this facility.

d. Post Construction Changes

No records are available of significant post construction changes. Representatives of the Village of Waterville indicate the reservoir was drained and accumulated silt removed in 1980, but the dam structure was untouched.

e. Seismic Stability

No known faults exist in the vicinity of the dam. Several lineaments in the general area, which suggests possible fault lines, are noted in the Brittle Structures Map for the area (Ref. 17) One northeast trending lineament is noted about one mile north of the dam. Another lineament about one mile east of the dam trends northwest.

The rock bedding dips less than one degree to the southwest. Joints are close to vertical. The area is located within Zone 2 of the Seismic Probability Map. Only minor earthquake activity has occurred in this region. The most severe activity, indicated as intensity V-VI on the Modified Mercalli scale, occurred in 1840 in the Utica area, about 17 miles east-northeast of the dam site. Several others of lesser intensity, II or less, have occurred at various times in the past. The most recent, as well as the closest to the dam, took place in 1979 in the Chadwicks area about five miles northeast of the dam.

6.2 EVALUATION OF STRUCTURAL STABILITY

The dam embankment appears to be in good condition structurally, except for the noted seepage. The seepage condition, reportedly a condition which has been ongoing for a period of many years, apparently has not had any significant advance structural effects. However, an investigation should be conducted to determine the source of the seepage. Remedial work as determined by this investigation should be undertaken by the owner. Upon completion of the work, it is recommended that the embankment and toe area experiencing dampness and seepage be maintained on a continuous basis, with records kept of these monitoring observations, to obtain information on the condition and to detect the conditions which would indicate the need for additional remedial measures.

SECTION 7: ASSESSMENT/REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Safety

The Phase I inspection of the New Waterville Reservoir did not indicate conditions which would constitute an immediate hazard to human life or property.

The hydrologic/hydraulic analysis establishes the spillway capacity as 30 percent of the Probable Maximum Flood (PMF). The dam will be overtopped by 0.6 feet by the PMF and 0.3 feet under the 1/2 PMF. An analysis of failure of the dam during the 1/2 PMF event indicates that the downstream hazard will not be significantly increased from that which would occur just prior to the dam failure. Therefore, the spillway is assessed as inadequate according to the Corps of Engineers' screening criteria.

The visual inspection did not reveal conditions which would indicate evidence of structural displacement or instability.

The following specific safety assessments are based on the Phase I Visual Examination and Analysis of Hydrology and Hydraulics, and Structural Stability:

1. A considerable area of seepage exists near the center of the dam at an elevation approximately 15 feet above the toe. Seepage was also found in the original ground beyond the toe of the dam.

2. Woodchuck burrows were found to exist on the exterior slope of the embankment.

3. The slope of the embankment is overgrown with trees and brush.

4. No warning system is presently in effect to alert the public should conditions occur which could result in failure of the dam.

5. No formalized inspection system is in effect at the facility.

b. Adequacy of Information

The information available is adequate for a Phase I investigation report.

c. Urgency

Items 1 through 5 of the Safety Assessment should be addressed by the Owner and appropriate actions taken within one year of this notification. The necessary investigations should be started within 3 months. The necessary remedial work as determined by the investigation should be completed within 18 months.

d. Need for Additional Investigation

An investigation should be conducted to determine the source of seepage at the toe of the embankment. Remedial work should be undertaken depending on the results of this investigation.

7.2 RECOMMENDED MEASURES

The following is a list of recommended measures to be undertaken to insure safety of this facility:

1. Woodchuck burrows should be filled in and the rodents eliminated from the facility.

2. Trees and brush on the slope should be removed and a sod cover established to allow for easy inspection of the embankment.

3. A flood warning and emergency evacuation system should be implemented to alert the public in the event conditions occur which could result in failure of the dam.

4. A formalized inspection system should be initiated to develop data on conditions and maintenance operations at the facility.

APPENDIX A

PHOTOGRAPHS

2. Upstream view of embankment looking towards left abutment. Emergency spillway at far end of embankment.

3. Crest of embankment looking towards left abutment.

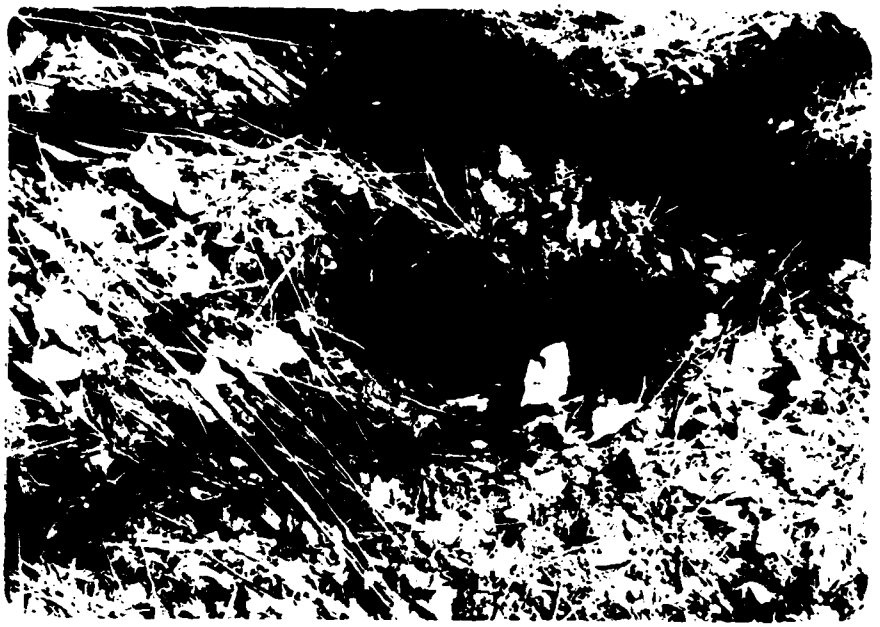
4. Downstream slope of embankment looking towards left abutment.

5. Crest of embankment looking towards right abutment. Principal spillway at far end of embankment. Gate house at left.

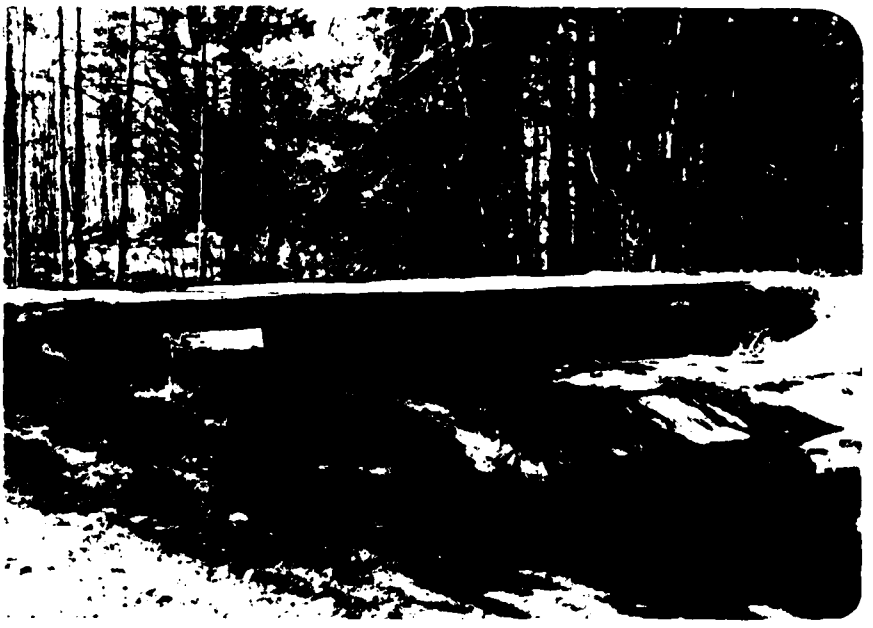
6. Downstream slope of embankment. Wet area in foreground, gate-house in left background.

7. Wet area of down-stream embankment.

8. Scarp at toe embankment near abutment. Note color.



9. Animal burrow in downstream ment.



10. Emergency spillw viewed from upstr

11. Emergency spillway channel, looking downstream.

12. Principal spillway structure as viewed from upstream.

13. Outlet pipe of the principal spillway structure.

14. Downstream hazard area, reservoir receiving stream in foreground.

APPENDIX B

VISUAL INSPECTION CHECKLIST

)3-15-3(9/80)

VISUAL INSPECTION CHECKLIST

1) Basic Data

a. General

Name of Dam NEW WATERVILLE RESERVOIR DAM

Fed. I.D. # NY 195 DEC Dam No. _____

River Basin MOHAWK RIVER

Location: Town SANGERFIELD County ONEIDA

Stream Name SHEEPSKIN HOLLOW (BLAIR BROOK)

Tributary of ORISKANY CREEK

Latitude (N) 42-56.0 Longitude (W) 75-19.7

Type of Dam EARTH

Hazard Category HIGH

Date(s) of Inspection MARCH 13, 1981 ; APRIL 10, 1981 SNOW COVER ON 3-13-81 PREVENTED COMPLETE INSPECTION OF THE DAM.

Weather Conditions OVERCAST 40° FAIR 65°

Reservoir Level at Time of Inspection AT SPILLWAY ELEVATION 1506'

b. Inspection Personnel FLUBACZEWSKI, J.A. GOMEZ, D.F. MCCARTHY, H. MUSSETT - DALE ENGINEERING COMPANY; GENE OSTRANDER, JACK YOUNGS - VILLAGE OF WATERVILLE DEPT OF PUBLIC WORKS.

c. Persons Contacted (Including Address & Phone No.)

JAMES KLOSTER
CLERK-TREASURER
VILLAGE OF WATERVILLE TELEPHONE: 315-841-4221
VILLAGE HALL
214 WHITE ST.
WATERVILLE N.Y
13480

d. History:

Date Constructed 1907 Date(s) Reconstructed —

Designer KNIGHT, HOPKINS ENGINEERS - ROME N.Y.

Constructed By UNKNOWN

Owner VILLAGE OF WATERVILLE

2) Embankment

a. Characteristics

(1) Embankment Material EARTH FILL

(2) Cutoff Type CONCRETE CORE WALL EXTENDS TO "ROCK OR OTHER SATISFACTORY MATERIAL" PER PLANS

(3) Impervious Core CONCRETE CORE WALL TO 2'-6" BELOW CREST

(4) Internal Drainage System NONE

(5) Miscellaneous —

b. Crest

(1) Vertical Alignment UNIFORM, MINOR RUTTING FROM VEHICULAR TRAFFIC

(2) Horizontal Alignment UNIFORM

(3) Surface Cracks NONE OBSERVED

(4) Miscellaneous NONE

c. Upstream Slope

(1) Slope (Estimate) (V:H) 1:2

(2) Undesirable Growth or Debris, Animal Burrows LIGHT BRUSH AT TOP

(3) Sloughing, Subsidence or Depressions NONE - UNIFORM

(4) Slope Protection CONCRETE SLABS @ WATER LINE. GOOD CONDITION

(5) Surface Cracks or Movement at Toe NOT OBSERVABLE

d. Downstream Slope

(1) Slope (Estimate - V:H) 1 : 1 3/4

(2) Undesirable Growth or Debris, Animal Burrows FEW WOODCHUCK BURROWS

(3) Sloughing, Subsidence or Depressions NONE UNIFORM

(4) Surface Cracks or Movement at Toe NONE OBSERVED

(5) Seepage SEEPAGE IS MODERATE TO SLIGHT FOR 100 ± ft to an ELEVATION 15 FT ABOVE THE TOE

(6) External Drainage System (Ditches, Trenches; Blanket) NONE

(7) Condition Around Outlet Structure GOOD - NO EROSION.

(8) Seepage Beyond Toe SOME SEEPAGE BEYOND TOE AT CENTER OF DAM & AT LEFT (RIGHT OF VALVE HOUSE

e. Abutments - Embankment Contact

RIGHT ABUTMENT - GOOD

LEFT ABUTMENT - SEEPAGE - FLOWING WATER IN ORIGINAL STREAM BED NO PIPING OR BOILS NOTED.

(1) Erosion at Contact NO SIGNIFICANT EROSION

(2) Seepage Along Contact APPROX 100 FT OF THE CENTER TOE HAS SEEPAGE, NO SLOUGHING, NO EROSION, VERY SLIGHT DEPRESSION

3) Drainage System

a. Description of System NONE

b. Condition of System —

c. Discharge from Drainage System —

4) Instrumentation (Momumentation/Surveys, Observation Wells, Weirs, Piezometers, Etc.) NONE

5) Reservoir

a. Slopes STABLE, FORESTED - RED & SCOTCH PINE

b. Sedimentation SEDIMENT REMOVED IN 1980

c. Unusual Conditions Which Affect Dam NONE

6) Area Downstream of Dam

a. Downstream Hazard (No. of Homes, Highways, etc.) 2 HOMES ADJACENT TO STREAM - APPROX 1/2 MILE.

b. Seepage, Unusual Growth SEEPAGE FROM SLOPES OF ORIGINAL GROUND DOWNSTREAM

c. Evidence of Movement Beyond Toe of Dam NONE

d. Condition of Downstream Channel STEEP NARROW GULLY

7) Spillway(s) (Including Discharge Conveyance Channel)

6 ft WIDE SERVICE SPILLWAY DISCHARGES TO 24" CIP.
21'8" WIDE EMERGENCY SPILLWAY DISCHARGES TO CHANNEL IN ORIGINAL GROUND

a. General BOTH SPILLWAYS CLEAR AND IN OPERATING CONDITION.

b. Condition of Service Spillway GOOD CONDITION - SMALL AMOUNT OF DEBRIS ON TRASH RACK. VILLAGE INTENDS TO INSTALL 6" FLASH BOARDS IN ANTICIPATION OF DRY SUMMER

c. Condition of Auxiliary Spillway GOOD CONDITION - CLEAR NO INDICATION OF RECENT FLOW THROUGH THIS FACILITY

d. Condition of Discharge Conveyance Channel GOOD, OPEN NO EROSION WHICH WOULD EFFECT THE STRUCTURE.

8) Reservoir Drain/Outlet

Type: Pipe ✓ Conduit _____ Other _____

Material: Concrete _____ Metal ✓ Other _____

Size: 12" Length 156' ±

Invert Elevations: Entrance 1477 ± Exit 1473.5 ±

Physical Condition (Describe): Unobservable ✓

Material: CAST IRON.

Joints: UNKNOWN Alignment UNKNOWN

Structural Integrity: NO PROBLEMS DETECTED IN 1980 WHEN IMPOUNDMENT WAS DRAINED

Hydraulic Capability: _____

Means of Control: Gate _____ Valve ✓ Uncontrolled _____

Operation: Operable ✓ Inoperable _____ Other _____

Present Condition (Describe): OPERABLE DURING 1980

9) Structural

a. Concrete Surfaces N/A

b. Structural Cracking —

c. Movement - Horizontal & Vertical Alignment (Settlement) —

d. Junctions with Abutments or Embankments —

e. Drains - Foundation, Joint, Face —

f. Water Passages, Conduits, Sluices —

g. Seepage or Leakage —

h. Joints - Construction, etc. —

i. Foundation —

j. Abutments —

k. Control Gates —

l. Approach & Outlet Channels —

m. Energy Dissipators (Plunge Pool, etc.) —

n. Intake Structures SUBMERGED UNOBSERVABLE

o. Stability —

p. Miscellaneous —

10) Appurtenant Structures (Power House, Lock, Gatehouse, Other)

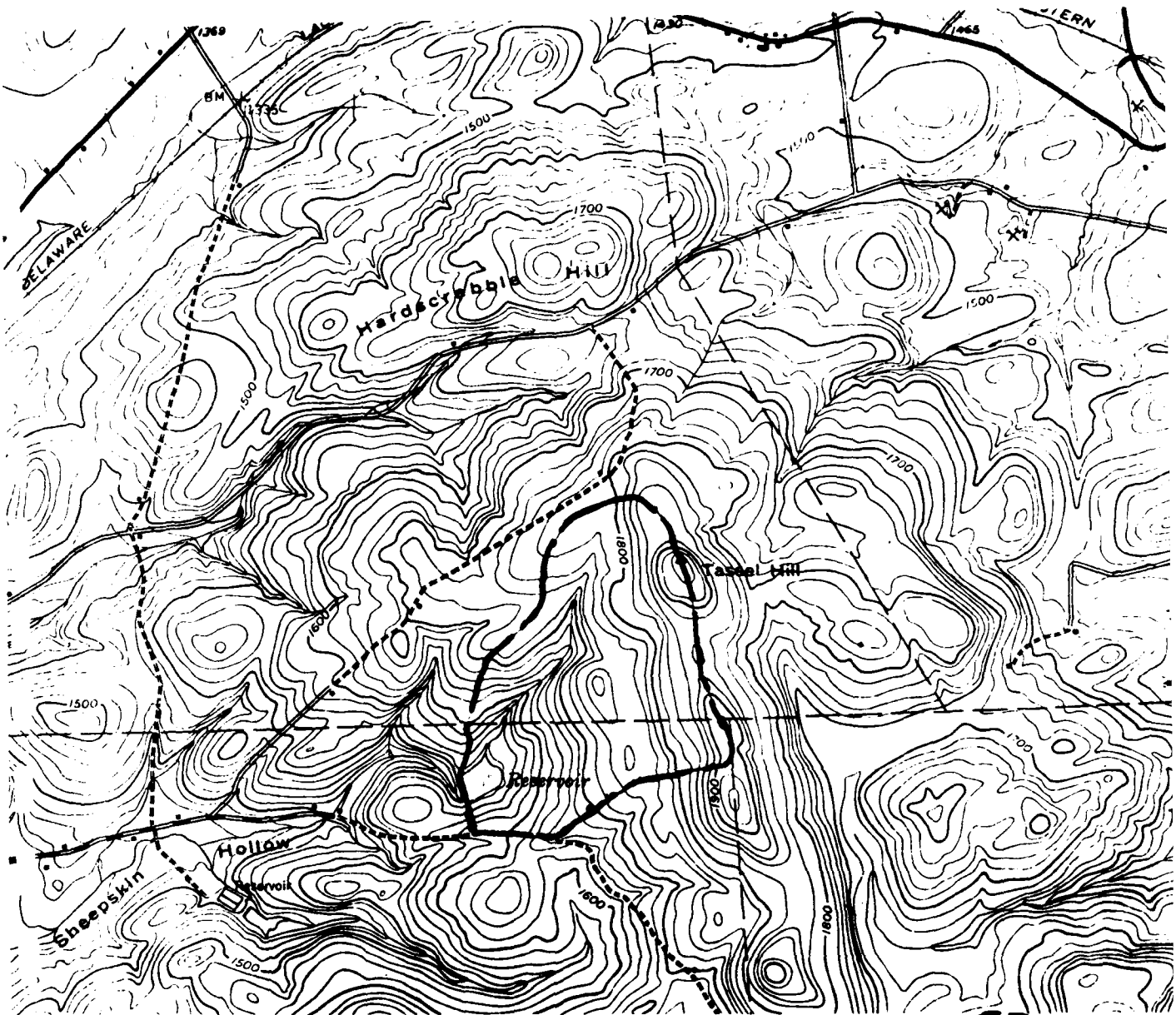
a. Description and Condition GATE HOUSE - SECURE OPERABLE

11) Operation Procedures (Lake Level Regulation):

WATER IS DRAWN FROM IMPOUNDMENT ACCORDING TO DEMANDS OF THE SYSTEM EXCESS IS DISCHARGE THROUGH SERVICE SPILLWAY OVERFLOW (EMERGENCY) SPILLWAY IS NOT KNOWN TO HAVE DISCHARGED IN APPROX 25 YRS. SITE IS VISITED EVERY 2 WEEKS (APPROX.) NO FORMAL INSPECTION PROCEDURE

APPENDIX C

HYDROLOGIC/HYDRAULIC, ENGINEERING DATA AND COMPUTATIONS



SCALE: 1" = 2000'

LEGEND

WATERSHED AREA

DRAINAGE BASIN

STETSON • DALE BANKERS TRUST BUILDING UTICA • NEW YORK • 13501
TEL 315-797-5800

DESIGN BRIEF

PROJECT NAME N.Y.S. Dam Inspections 1981 DATE 12-19-80

SUBJECT New Waterville Reservoir ID# 195 PROJECT NO. 2520

Depth-Area-Duration DRAWN BY JAG

PMP from HMR # 33
for Lat. ~ 42°56' Long. ~ 75°20'
Index Rainfall = 19.8" for 200 mi², 24 hr
Zone 1

Duration	% Index*	Depth
6 hrs.	111	22.0"
12 hrs.	123	24.4
24 hrs	133	26.3
48 hrs	142	28.1

* Adjusted for site area, Drainage Area = 0.382 mi²
(which is less than the lower limit of the areal adjustment graph, 10 mi², therefore these values were adjusted for this lower limit)

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DESIGN BRIEF

PROJECT NAME N.Y.S. Dam Inspections - 1981 DATE 4-[illegible]3

SUBJECT New Waterville Reservoir Dam PROJECT NO.

Hydrologic Parameters DRAWN BY JA:J

Drainage Area = 0.382 mi^2

$L = 4700' = 0.89$ mi

$L_{CA} = 2300' = 0.436$ mi

$C_t = 2$ (Assumed)

$t_1 = C_t (L \times L_{CA})^{0.5}$

$t_1 = 1.50$ hr.

$C_p = 0.625$ (Assumed)

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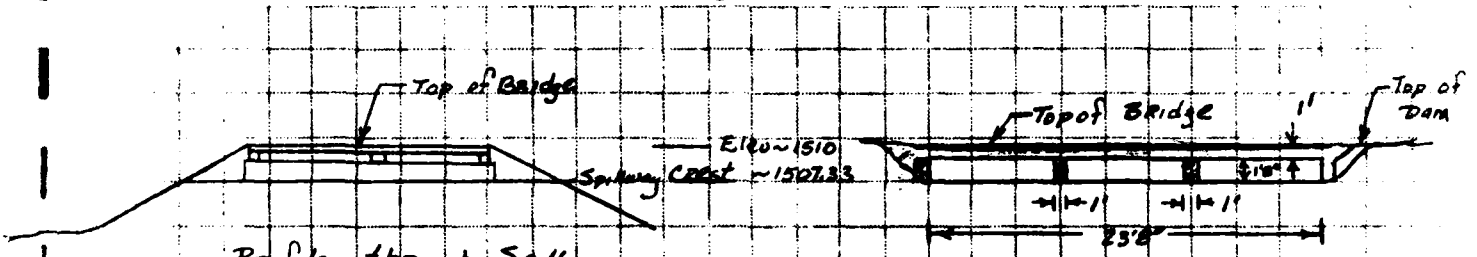
PROJECT NAME N.Y.S. Dam Inspections - 1981 DATE 4-14-82

SUBJECT New Waterville Reservoir Dam PROJECT NO.

Emergency Spillway Rating DRAWN BY JAG



Profile through Spillway

Spillway Cross Section

Effective Spillway Dimensions

Effective Width = 23'8" - 2(1') = 21'8" = 21.67'

Clear height = 1'8" = 1.67'

From Elev. 1507.33 to 1509 Spillway will operate under weir flow $Q = C L H^{3/2}$ $C \approx 2.95$

Elev 1509+ and up flow through opening will be pressure flow $Q = \frac{2}{3} \sqrt{2g}\, C L (H_1^{3/2} - H_2^{3/2})$

C from Fig. 257 "Design of Small Dams"

Above Elev. 1510 also will have weir flow over bridge

Elev.	H	Q	Elev.	H_1	H_2	q/H_1	C	Q	
1507.33	0	0	1509.2	1.87'	0.2'	0.89	0.625	178 cfs	
1507.5	0.17'	4.5 cfs	1509.4	2.07	0.4	0.81	0.633	200	
1507.7	0.37	14.4	1509.6	2.27	0.6	0.734	0.642	220	
1507.9	0.57	27.5	1509.8	2.47	0.8	0.674	0.648	238	
1508.1	0.77	43.2	1510.0	2.67	1.0	0.625	0.653	255	
1508.3	0.97	61	1510.2	2.87	1.2	0.582	0.658	271	*
1508.5	1.17	81	1510.4	3.07	1.4	0.544	0.662	286	
1508.7	1.37	103	1510.6	3.27	1.6	0.51	0.665	300	
1508.9	1.57	126	1510.8	3.47	1.8	0.48	0.669	314	
1509.0	1.67	138	1511.0	3.67	2.0	0.455	0.672	327	

* Does not include weir flow over bridge.

(Flow over bridge included in HEC-1 DB as flow over dam

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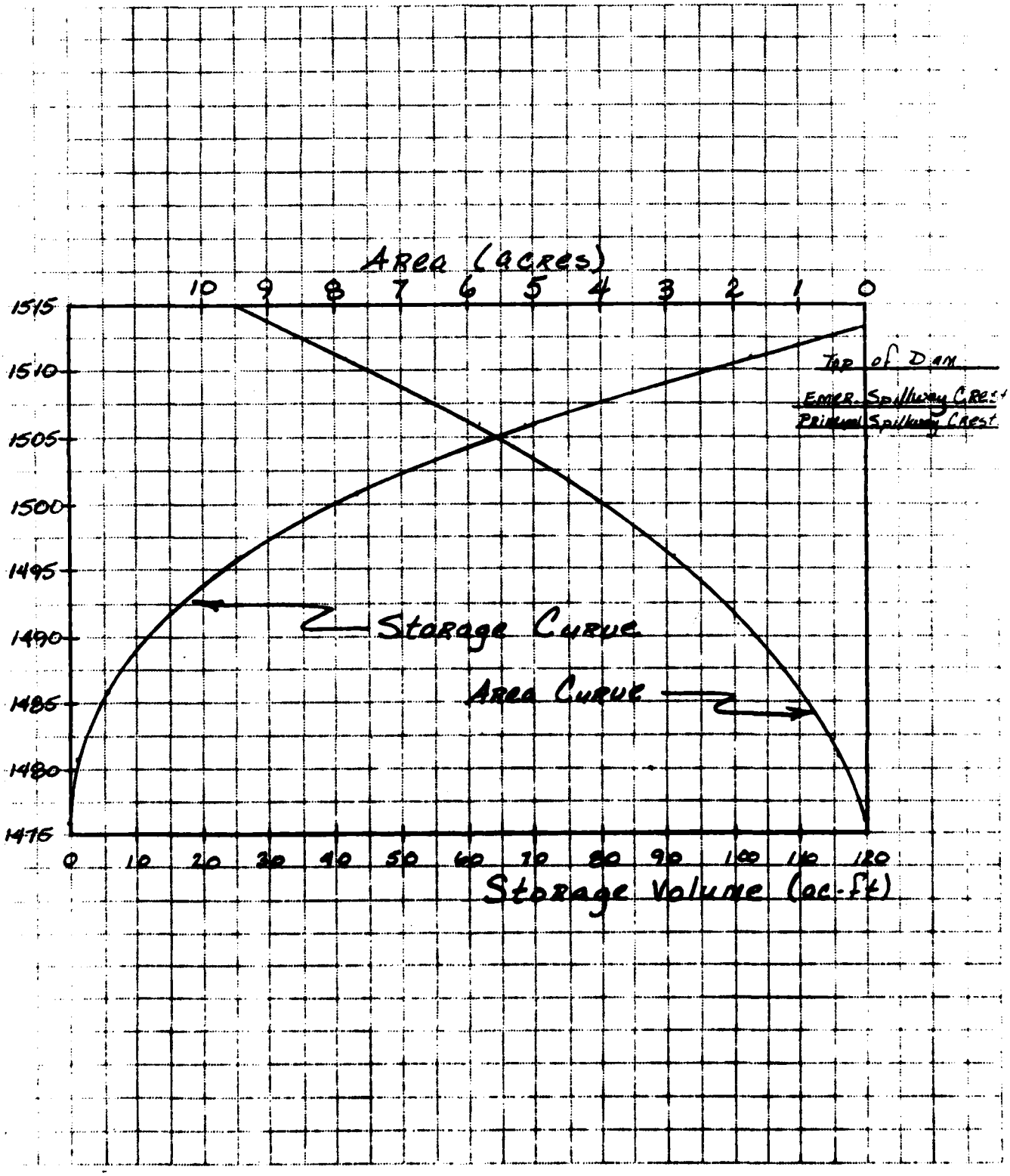
DESIGN BRIEF

PROJECT NAME N.Y.S. Dam Inspections -1981 DATE 4-7-81

SUBJECT New Waterville Reservoir PROJECT NO.

Area Capacity Curve DRAWN BY JAG



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DESIGN BRIEF

PROJECT NAME N.Y.S. Dam Inspections - 1981 DATE

SUBJECT New Waterville Reservoir PROJECT NO.

Drain Line Capacity DRAWN BY JAG

12" ϕ pipe
Inlet Invert @ 1477±
Outlet Invert @ 1473.5±

Length = 148'
Valve opening effective loss ~ 40 = 7 LF N(7) = 7'
So effective length = 155'

Capacity with water level @ 1506 - Principal Spillway Crest
Head = 29' H = 29' + (1477 - 1494) = 32'
Depth of CH = 14'
n ~ .013

$$Q = A\sqrt{\frac{2gH}{1+K_e+K_b+K_pL}}$$

K_e = entrance loss ~ 0.5
K_b = bend losses ~ 0
K_f = friction loss = $\frac{5100\,n^2}{D^{4/3}} = \frac{5100\,(.013)^2}{(12")^{4/3}} = .03137$

$K_pL = .03137\,(155') = 4.86$
$A = \pi D^2/4 = \frac{\pi}{4} = 0.7854\ ft^2$

$$Q = 0.7854\ ft^2\sqrt{\frac{64.4\ ft/sec^2\,(32')}{6.36}}$$

$Q = 14.13$ cfs

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DESIGN BRIEF

PROJECT NAME N.Y.S. Dam Inspections - 1981 DATE

SUBJECT New Waterville Reservoir PROJECT NO.

Service Spillway Capacity DRAWN BY JAG

24"Ø Cast Iron Pipe serves as the conduit for the service spillway and controls the discharge capacity

Inlet Invert @ Elev. 1501
Outlet Invert @ Elev. 1455
Length ~218'

Checking both Inlet Control & Full Flow - Since which governs Inlet control based on Fig. 8-8 from "Design of Small Dams" & Full Flow by

$$Q = A\sqrt{\frac{2gH}{1+K_e+K_b+K_fL}}$$

K_e = entrance coeff. 0.5

K_b (bend loss coeff.) $= \frac{n\beta}{3} = \frac{.013(10°)}{3} + \frac{0.013(18.5°)}{3}$

$K_b = 0.1235$

K_{fp} (Friction loss coeff.) $= \frac{5100n^2}{D^{4/3}} = \frac{5100(.013)^2}{(24)^{4/3}} = .01245$

$K_{fp}L = .01245(218) = 2.71$

$A = \frac{\pi D^2}{4} = \pi ft^2$

$$Q = \pi\sqrt{\frac{64.4H}{40.5+2.71+0.235}} = \pi\sqrt{14.847H}$$

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DESIGN BRIEF

PROJECT NAME _____ DATE _____

SUBJECT New Waterville PROJECT NO. _____

Service Spillway Capacity DRAWN BY JAG

Elev.	H_1	H_1/D	Q_{H_1}	H	Q_{weir}	$Q_{governing}$	
1507	6'	3	39 cfs	47'	83 cfs	39 cfs	
1508	7	3.5	43	48	84	43 cfs	
1509	8	4	46	49	85	46 cfs	
1510	9	4.5	51	50	86	51 cfs	Top of Dam

NY #195

CHECK LIST FOR DAMS
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

AREA-CAPACITY DATA:

	Elevation (ft.)	Surface Area (acres)	Storage Capacity (acre-ft.)
1) Top of Dam	1510	7.4	95
2) Design High Water (Max. Design Pool)	N.A		
3) Auxiliary Spillway Crest	1507.33	6.5	77
4) Pool Level with Flashboards			
5) Service Spillway Crest	1506	5.8	68

DISCHARGES

	Volume (cfs)
1) Average Daily	Unknown
2) Emergency Spillway @ [redacted] Top of Dam	255 cfs
3) Service Spillway @ [redacted] Top of Dam	51 cfs
4) Service Spillway @ Auxiliary Spillway Crest Elevation	40 cfs
5) Low Level Outlet (w/ Reservoir @ Top of Dam)	15 cfs
6) Total (of all facilities) @ Maximum High Water	321 cfs
7) Maximum Known Flood	Unknown
8) At Time of Inspection	Unknown

CREST: ELEVATION: 1510

Type: Earthfill

Width: 15' top width Length: 520'

Spillover Emergency spillway w/ concrete crest

Location Left abutment

SPILLWAY:

PRINCIPAL		EMERGENCY
1506	Elevation	1507.33
Broad crested overflow weir to 24" cast iron pipe outlet	Type	Broad crested
15'	Width	21'-8"
	Type of Control	
✓	Uncontrolled	✓
	Controlled:	
	Type (Flashboards; gate)	
	Number	
	Size/Length	
	Invert Material	Concrete
	Anticipated Length of operating service	
	Chute Length	
	Height Between Spillway Crest & Approach Channel Invert (Weir Flow)	

HYDROMETEROLOGICAL GAGES:

Type : None

Location: _____

Records:

Date - _____

Max. Reading - _____

FLOOD WATER CONTROL SYSTEM:

Warning System: None at Present

Method of Controlled Releases (mechanisms):

Through Water distribution System

DRAINAGE AREA: 0.38 mi^2

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

Land Use - Type: Forest

Terrain - Relief: Moderately Steep to steep hills

Surface - Soil:

Runoff Potential (existing or planned extensive alterations to existing (surface or subsurface conditions)

No extensive alterations to drainage area known

Potential Sedimentation problem areas (natural or man-made; present or future)

Natural Sedimentation
Sediment Removed in 1980

Potential Backwater problem areas for levels at maximum storage capacity including surcharge storage:

None

Dikes - Floodwalls (overflow & non-overflow) - Low reaches along the Reservoir perimeter:

Location: None

Elevation:

Reservoir:

Length @ Maximum Pool 0.12± (Miles)

Length of Shoreline (@ Spillway Crest) 0.36± (Miles)

```
( 0001)   ni      NE. WATERVILLE RESERVOIR DAM     FILE IS ASCII
( 0002)   AL      HEC-1DB (SNYDER PAREMETERS)
( 0003)   AS      PMP - DAM OVERTOPPING ANALYSIS
( 0004)   b       5         2         1         0         0         0         0         0         0         0
( 0005)   B1      5         0         0         0         0         0         0         0         0         0
( 0006)   J       1         7         1         0         0         0         0         0         0         0
( 0007)   J1    0.2       0.3       0.4       0.5       0.6       0.8       1.0
( 0008)   K       0       100         0         0         0         0         1         0         0         0
( 0009)   K1        RUNOFF SUBAREA 1
( 0010)   M       1         1     0.362         0     0.362         0         0         0         1         0
( 0011)   P       0      19.8       111       123       133       142         0         0         0         0
( 0012)   T       0         0         0         0         0         0       1.0       0.1         0      .125
( 0013)   W    1.50     0.625         0         0         0         0         0         0         0         0
( 0014)   X    -2.0     -0.10       1.6         0         0         0         0         0         0         0
( 0015)   K       1       1.0         0         0         0         0         1         0         0         0
( 0016)   K1        ROUTE THRU RESERVOIR AND OVER SPILLWAY
( 0017)   Y       0         0         0         1         1         0         0         0         0         0
( 0018)   Y1      1         0         0         0         0         0   -1507.3        -1         0         0
( 0019)   Y41507.3    1507.5    1507.7    1507.9    1508.1    1508.3    1508.5    1508.7    1508.9    1509.1
( 0020)   Y41509.2    1509.4    1509.6    1509.8    1510.0    1510.2    1510.4    1510.6    1510.8    1511.0
( 0021)   Y5        0       4.5      14.4      27.5        43        61        81       103       126       134
( 0022)   Y5      176       200       220       238       255       271       286       300       314       327
( 0023)   $S        0      1.15      5.48     13.63     25.73     43.53     68.66        81      84.3        88
( 0024)   $S     91.3      94.8      98.4     102.7       106       110     118.3     127.3       137     147.2
( 0025)   $E     1476      1481      1486      1491      1496      1501      1506      1508    1508.5      1509
( 0026)   $E1509.5      1510    1510.5      1511    1511.5      1512      1513      1514      1515      1516
( 0027)   $$1507.5
( 0028)   $D     1510      2.65       1.5       518         0         0         0         0         0         0
( 0029)   K       99         0         0         0         0         0         0         0         0         0
( 0030)   A
( 0031)   A
( 0032)   A
( 0033)   A
( 0034)   A
```

SUMMARY OF SEQUENCE OF STREAM NETWORK CALCULATIONS

RUNOFF HYDROGRAPH AT	100
ROUTE HYDROGRAPH TO	100
END OF NETWORK	

```
**********************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
**********************************

RUN  DATE?WED, APR 15 1981
     TIME?09:22:12
```

NEW WATERVILLE RESERVOIR DAM FILE IS ALT4
HEC-1DB (SNYDER PAREMETERS)
PMF - DAM OVERTOPPING ANALYSIS

JOB SPECIFICATION

NO	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
500	0	12	0	0	0	0	0	4	0

JOPER	NWT	LROPT	TRACE
5	0	0	0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 7 LRTIO= 1

RTIOS= 0.20 0.30 0.40 0.50 0.60 0.80 1.00

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

RUNOFF SUBAREA 1

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
100	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	0.38	0.10	0.38	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	19.00	111.00	123.00	136.00	142.00	0.00	0.00

TPSFC COMPUTED BY THE PROGRAM IS 2.500

LOSS DATA

LOSS	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.10	0.00	0.00

UNIT HYDROGRAPH DATA
T = 1.5 CP = .65 NTA=

PEAK OUTFLOW IS 168. AT TIME 41.50 HOURS

PEAK OUTFLOW IS 256. AT TIME 41.67 HOURS

PEAK OUTFLOW IS 351. AT TIME 41.17 HOURS

PEAK OUTFLOW IS 469. AT TIME 41.17 HOURS

PEAK OUTFLOW IS 587. AT TIME 41.17 HOURS

PEAK OUTFLOW IS 703. AT TIME 41.17 HOURS

PEAK OUTFLOW IS 929. AT TIME 41.17 HOURS

********** ********** ********** ********** **********

RECESSION DATA

STRTQ= -2.00 QRCSN= -0.10 RTIOR= 1.60

UNIT HYDROGRAPH 5 END-OF-PERIOD ORDINATES, LAG= 1.51 HOURS, CP= 0.63 VOL= 1.00

4.	14.	28.	44.	61.	78.	91.	103.	105.	104.
96.	85.	78.	67.	59.	53.	47.	41.	37.	33.
29.	26.	23.	20.	18.	16.	14.	13.	11.	10.
9.	8.	7.	6.	5.	5.	4.	4.	3.	3.
3.	2.	2.	2.	2.	1.	1.	1.	1.	1.

C F DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	END-OF-PERIOD FLOW MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	22.49	18.90	3.60	26299.
										(571.)(	480.)(	91.)(	801.34)

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

ROUTE THRU RESERVOIR AND OVER SPILLWAY

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
100	1	0	0	0	0	1	0	

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1507.	-1

STAGE	1507.0	1507.2	1507.4	1507.6	1507.8	1508.0	1508.2	1508.4	1508.6	1508.8
	1509.2	1509.4	1509.6	1509.8	1510.0	1510.2	1510.4	1510.6	1510.8	
FLOW	.00	4.50	14.40	27.50	43.00	61.00	81.00	103.00	126.00	
	149.00	200.00	229.00	238.00	255.00	271.00	286.00	300.00	314.00	
CAPACITY=	0.	1.	5.	14.	26.	44.	69.	81.	84.	88.
	91.	95.	98.	103.	106.	110.	118.	127.	137.	147.
ELEVATION=	1476.	1481.	1486.	1491.	1496.	1501.	1506.	1508.	1509.	1509.
	1510.	1511.	1511.	1511.	1512.	1512.	1513.	1514.	1515.	1516.

CREL	SPWID	CCOM	EXPW	ELEVL	COGL	CAREA	EXPL
1509.5	0.0	3.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAM ID
1511.	.0	1.5	511.

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS						
				RATIO 1	RATIO 2	RATIO 3	RATIO 4	RATIO 5	RATIO 6	RATIO 7
				0.20	0.30	0.40	0.50	0.60	0.80	1.00
HYDROGRAPH AT	100	2.36	1	196.	294.	392.	490.	588.	785.	981.
		(6.09)		(5.55)(	8.33)(	11.11)(	13.89)(	16.66)(	22.22)(	27.77)(
ROUTED TO	101	2.36	1	182.	256.	391.	489.	587.	783.	979.
		(6.09)		(5.10)(	7.25)(	11.07)(	13.85)(	16.62)(	22.17)(	27.72)(

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1507.30	1507.30	1510.00
STORAGE	77.	77.	95.
OUTFLOW	0.	0.	255.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.20	1509.22	0.00	89.	180.	0.00	41.50	0.00
0.33	1510.00	0.00	95.	256.	0.33	41.67	0.00
0.47	1510.20	0.20	96.	391.	2.33	41.17	0.00
0.53	1510.29	0.29	97.	489.	3.17	41.17	0.00
0.60	1510.37	0.37	97.	587.	3.67	41.17	0.00
0.60	1510.50	0.50	98.	783.	4.83	41.17	0.00
1.00	1511.62	0.62	99.	979.	5.67	41.17	0.00

```
(0001)   A1       NEW WATERVILLE RESERVOIR DAM     FILE IS ABTM-1
(0002)   A2       HEC-1DB (SNYDER PAREMETERS)
(0003)   A3       PMF - DAM BREAK ANALYSIS
(0004)   B     300       0      10       0       0       0       0       0       4       0
(0005)   B1      5       0       0       0       0       0       0       0       0       0
(0006)   J       9       1       1       0       0       0       0       0       0       0
(0007)   J1    0.5       0       0       0       0       0       0       0       0       0
(0008)   K       0     100       0       0       0       0       1       0       0       0
(0009)   K1       RUNOFF SUBAREA 1
(0010)   M       1       1   0.382       0   0.382       0       0       0       1       0
(0011)   P       0    19.8     111     123     133     142       0       0       0       0
(0012)   T       0       0       0       0       0       0     1.0     0.1       0    .025
(0013)   W    1.50   0.625       0       0       0       0       0       0       0       0
(0014)   X    -2.5   -0.10     1.6       0       0       0       0       0       0       0
(0015)   K       1     100       0       0       0       0       1       0       0       0
(0016)   K1       ROUTE THRU RESERVOIR AND OVER SPILLWAY
(0017)   Y       0       0       0       1       1       0       0       0       0       0
(0018)   Y1      1       0       0       0       0       0   -1507.3      -1       0       0
(0019)   Y41507.3  1507.5  1507.7  1507.9  1508.1  1508.3  1508.5  1508.7  1508.9  1509.0
(0020)   Y41509.2  1509.4  1509.6  1509.8  1510.0  1510.2  1510.4  1510.6  1510.8  1511.0
(0021)   Y5      0     4.5    14.4    27.5      43      61      81     103     126     138
(0022)   Y5    178     200     220     238     255     271     286     300     314     327
(0023)   $S      0    1.15    5.48   13.63   25.73   43.53   68.66      81    84.3      88
(0024)   $S   91.3    94.8    98.4   102.7     106     110   118.3   127.3     137   147.2
(0025)   $E   1476    1481    1486    1491    1496    1501    1506    1508  1508.5    1509
(0026)   $E1509.5    1510  1510.5    1511  1511.5    1512    1513    1514    1515    1516
(0027)   $S1507.3       0       0       0       0       0       0       0       0       0
(0028)   $D   1510    2.65     1.5     518       0       0       0       0       0       0
(0029)   $B     35     0.5    1476     0.5  1507.3 1510.28       0       0       0       0
(0030)   $B     35     0.5    1476       2  1507.3 1510.28       0       0       0       0
(0031)   $B     35     0.5    1476       5  1507.3 1510.28       0       0       0       0
(0032)   $B    100     0.5    1476     0.5  1507.3 1510.28       0       0       0       0
(0033)   $B    100     0.5    1476       2  1507.3 1510.28       0       0       0       0
(0034)   $B    100     0.5    1476       5  1507.3 1510.28       0       0       0       0
(0035)   $B    150     0.5    1476     0.5  1507.3 1510.28       0       0       0       0
(0036)   $B    150     0.5    1476       2  1507.3 1510.28       0       0       0       0
(0037)   $B    150     0.5    1476       5  1507.3 1510.28       0       0       0       0
(0038)   K       1     200       0       0       0       0       1       0       0       0
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```
(0039)  K1        ROUTE DOWNSTREAM OF DAM
(0040)  Y         1         0         0         1         1         0         0         0         0         0
(0041)  Y1        1         0         0         0         0         0        -1         0         0         0
(0042)  Y6    0.060     0.035     0.080      1460      1520       500      0.01         0         0         0
(0043)  Y7      100      1520       220      1480       294      1463       300      1460       312      1460
(0044)  Y7      318      1463       390      1480       520      1520         0         0         0         0
(0045)  K         1       300         0         0         0         0         1         0         0         0
(0046)  K1        ROUTE DOWN STREAM OF DAM
(0047)  Y         0         0         0         1         1         0         0         0         0         0
(0048)  Y1        1         0         0         0         0         0        -1         0         0         0
(0049)  Y6    0.080     0.035     0.080      1438      1500       700    0.0314         0         0         0
(0050)  Y7      100      1500       210      1460       348      1441       354      1438       366      1438
(0051)  Y7      372      1441       440      1460       590      1500         0         0         0         0
(0052)  K         1       400         0         0         0         2         1         0         0         0
(0053)  K1        ROUT TO DOWNSTREAM HAYARD AREA
(0054)  Y         0         0         0         1         1         1         0         0         0         0
(0055)  Y1        1         0         0         0         0         0        -1         0         0         0
(0056)  Y6    0.060     0.035     0.060      1409      1460      1000    0.029         0         0         0
(0057)  Y7      100      1460       520      1420       698      1412       704      1409       716      1409
(0058)  Y7      722      1412       910      1420      1150      1460         0         0         0         0
(0059)  K        99         0         0         0         0         0         0         0         0         0
(0060)  A
(0061)  A
(0062)  A
(0063)  A
(0064)  A
```

PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

RUNOFF HYDROGRAPH AT	100
ROUTE HYDROGRAPH TO	100
ROUTE HYDROGRAPH TO	200
ROUTE HYDROGRAPH TO	300
ROUTE HYDROGRAPH TO	400
END OF NETWORK	

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**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
**********

RUN  DATE?WED, AUG 26 1981
     TIME?13:21:37
```

NEW WATERVILLE RESERVOIR DAM FILE IS ABTM-1
HEC-1DB (SNYDER PAREMETERS)
PMF - DAM BREAK ANALYSIS

JOB SPECIFICATION

NG	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
300	0	10	0	0	0	0	0	4	0

JOPER	NWT	LROPT	TRACE
5	0	0	0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 9 NRTIO= 1 LRTIO= 1

RTIOS= 0.50

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

RUNOFF SUBAREA 1

ISTAQ	ICOPP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
100	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	0.38	0.00	0.38	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	19.80	111.00	123.00	133.00	142.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS 0.000

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.10	0.00	1.02

UNIT HYDROGRAPH DATA
TP= 1.50 CP= .63 NTA=

RECESSION DATA
STRTQ= -2.00 QRCSN= -0.10 RTIOR= 1.60

UNIT HYDROGRAPH 5 END-OF-PERIOD ORDINATES, LAG= 1.51 HOURS, CP= 0.63 VOL= 1.00

4.	14.	28.	44.	61.	78.	91.	100.	105.	104.
96.	85.	76.	67.	59.	53.	47.	41.	37.	33.
29.	26.	23.	20.	18.	16.	14.	13.	11.	10.
9.	8.	7.	6.	5.	4.	4.	3.	3.	3.
3.	2.	2.	2.	2.	1.	1.	1.	1.	1.

0

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	END-OF-PERIOD FLOW COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	22.49	18.90	3.60	28299.
										(571.)(480.)(91.)(801.34)			

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

ROUTE THRU RESERVOIR AND OVER SPILLWAY

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
100	1	0	0	0	0	1	0	0

ALL PLANS HAVE SAME ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1507.	-1

STAGE	1507.30	1507.50	1507.70	1507.90	1508.10	1508.30	1508.50	1508.70	1508.90
	1509.20	1509.40	1509.60	1509.80	1510.00	1510.20	1510.40	1510.60	1510.80
FLOW	0.00	4.50	14.40	27.50	43.00	61.00	81.00	103.00	126.00
	178.00	203.00	220.00	238.00	255.00	271.00	286.00	300.00	314.00
CAPACITY=	0.	1.	5.	14.	26.	44.	69.	81.	84.	88.
	91.	95.	98.	103.	106.	110.	118.	127.	137.	147.
ELEVATION=	1476.	1481.	1486.	1491.	1496.	1501.	1506.	1508.	1509.	1509.
	1511.	1511.	1511.	1511.	1512.	1512.	1513.	1514.	1515.	1516.

CREL	SPWID	COOW	EXPW	ELEVL	COQL	CAREA	EXPL
1507.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COOD	EXPD	DAMWID
1510.0	2.6	1.5	518.

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
35.	0.50	1476.00	0.50	1507.30	1510.28

BEGIN DAM FAILURE AT 41.00 HOURS

PEAK OUTFLOW IS 4290. AT TIME 41.28 HOURS

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
35.	0.50	1476.00	2.00	1507.30	1510.28

BEGIN DAM FAILURE AT 41.00 HOURS

PEAK OUTFLOW IS 1548. AT TIME 41.58 HOURS

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
35.	0.50	1476.00	5.00	1507.30	1510.28

BEGIN DAM FAILURE AT 41.00 HOURS

PEAK OUTFLOW IS 874. AT TIME 42.17 HOURS

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
100.	0.50	1476.00	0.50	1507.30	1510.28

BEGIN DAM FAILURE AT 41.00 HOURS

PEAK OUTFLOW IS 4672. AT TIME 41.15 HOURS

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
100.	0.50	1476.00	2.00	1507.30	1510.28

BEGIN DAM FAILURE AT 41.00 HOURS

PEAK OUTFLOW IS 1696. AT TIME 41.42 HOURS

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
100.	0.50	1476.00	5.00	1507.30	1510.28

BEGIN DAM FAILURE AT 41.00 HOURS

PEAK OUTFLOW IS 959. AT TIME 41.50 HOURS

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
150.	0.50	1476.00	0.50	1507.30	1510.28

BEGIN DAM FAILURE AT 41.00 HOURS

PEAK OUTFLOW IS 4938. AT TIME 41.13 HOURS

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
150.	0.50	1476.00	2.00	1507.30	1510.28

BEGIN DAM FAILURE AT 41.00 HOURS

PEAK OUTFLOW IS 1725. AT TIME 41.37 HOURS

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
150.	0.50	1476.00	5.00	1507.30	1510.28

BEGIN DAM FAILURE AT 41.00 HOURS

PEAK OUTFLOW IS 964. AT TIME 41.50 HOURS

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HYDROGRAPH ROUTING

ROUTE DOWNSTREAM OF DAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
230	1	0	0	0	0	1	0	0

ALL PLANS HAVE SAME ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
.0800	0.0350	0.0800	1460.0	1520.0	500.	0.01000

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
100.00 1520.00 220.00 1480.00 294.00 1463.00 300.00 1460.00 312.00 1460.00
318.00 1463.00 390.00 1480.00 520.00 1520.00

STORAGE	0.00	0.66	2.07	4.47	7.84	12.20	17.55	23.81	30.81
	46.95	56.09	65.95	76.52	87.81	99.81	112.53	125.96	140.11
OUTFLOW	0.00	425.36	1839.79	4355.55	8161.78	13437.81	20354.32	29250.46	40068.77
	67471.75	84221.47	103115.09	124236.34	147668.38	173493.66	201793.59	232648.97	266139.19
STAGE	1460.00	1463.16	1466.32	1469.47	1472.63	1475.79	1478.95	1482.10	1485.26
	1491.58	1494.73	1497.89	1501.05	1504.21	1507.37	1510.52	1513.68	1516.84
FLOW	0.00	425.36	1839.79	4355.55	8161.78	13437.81	20354.32	29250.46	40068.77
	67471.75	84221.47	103115.09	124236.34	147668.38	173493.66	201793.59	232648.97	266139.19

MAXIMUM STAGE IS 1469.1

MAXIMUM STAGE IS 1465.6

MAXIMUM STAGE IS 1464.1

MAXIMUM STAGE IS 1469.2

MAXIMUM STAGE IS 1465.9

MAXIMUM STAGE IS 1464.3

MAXIMUM STAGE IS 1469.3

MAXIMUM STAGE IS 1466.2

MAXIMUM STAGE IS 1464.3

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

ROUTE DOWN STREAM OF DAM

ISTAQ	ICOPP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
300	1	0	0	0	0	1	0	0

ALL PLANS HAVE SAME ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-1.	[illegible]

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0800	0.0350	0.0800	1438.0	1500.0	700.	0.0314

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

100.00 1500.00 210.00 1460.00 348.00 1441.00 354.00 1438.00 366.00 1438.00
372.00 1441.00 440.00 1460.00 590.00 1500.00

STORAGE	0.00	0.98	3.31	7.50	13.55	21.45	31.20	42.79	55.69
	84.83	101.07	118.42	136.88	156.46	177.15	198.95	221.86	245.88
OUTFLOW	0.00	809.71	3560.66	8673.98	16662.11	27994.09	43108.80	62744.23	87686.86
	150880.69	189355.75	232590.19	280724.44	333903.31	392273.44	455983.63	525182.13	600017.75
STAGE	1438.00	1441.26	1444.53	1447.79	1451.05	1454.31	1457.58	1460.84	1464.10
	1467.63	1473.89	1477.16	1480.42	1483.68	1486.94	1490.21	1493.47	1496.73
FLOW	0.00	809.71	3560.66	8673.98	16662.11	27994.09	43108.80	62744.23	87686.86
	150880.69	189355.75	232590.19	280724.44	333903.31	392273.44	455983.63	525182.13	600017.75

MAXIMUM STAGE IS 1444.9

MAXIMUM STAGE IS 1442.1

MAXIMUM STAGE IS 1441.3

MAXIMUM STAGE IS 1444.6

MAXIMUM STAGE IS 1442.5

MAXIMUM STAGE IS 1441.4

MAXIMUM STAGE IS 1444.7

MAXIMUM STAGE IS 1442.5

MAXIMUM STAGE IS 1441.4

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

ROUT TO DOWNSTREAM HAYARD AREA

```
                          ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                            400       1       0       0       0       2       1       0       0
                                                 ALL PLANS HAVE SAME
                                                     ROUTING DATA
                  QLOSS   CLOSS     AVG    IRES   ISAME    IOPT    IPMP            LSTR
                    0.0   0.000    0.00       1       1       1       0               0

                          NSTPS   NSTDL     LAG   AMSKK       X     TSK   STORA  ISPRAT
                              1       0       0   0.000   0.000   0.000     -1.       0


NORMAL DEPTH CHANNEL ROUTING
----------------------------

        QN(1)   QN(2)   QN(3)   ELNVT   ELMAX   RLNTH     SEL
       0.0600  0.0350  0.0600  1409.0  1460.0   1000.  0.02900

        CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
         100.00 1460.00  520.00 1420.00  698.00 1412.00  704.00 1409.00  716.00 1409.00
         722.00 1412.00  910.00 1420.00 1150.00 1460.00

  STORAGE        0.00        1.07        5.49       17.43       36.93       62.04       89.89      120.48      153.79
               228.61      270.11      314.34      361.35      410.98      463.43      518.54      576.42      637.02

  OUTFLOW        0.00      526.06     2751.57     9179.88    22013.34    44649.89    75238.33   113568.27   159802.06
            276952.38   348430.19   428908.56   518695.38   618100.13   727434.13   847007.75   977128.88  1118104.75

    STAGE     1409.00     1411.68     1414.37     1417.05     1419.74     1422.42     1425.10     1427.79     1430.47
              1435.84     1438.52     1441.21     1443.89     1446.58     1449.26     1451.95     1454.63     1457.31

     FLOW        0.00      526.05     2751.57     9179.88    22013.34    44649.89    75238.33   113568.27   159802.06
            276952.38   348430.19   428908.56   518695.38   618100.13   727434.13   847007.75   977128.88  1118104.75

                                       STATION     400, PLAN 1, RTIO 1

                                                OUTFLOW
                 0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
                 0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
                 0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
                 0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
                 0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
                 0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
                 0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
                 0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
                 0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
                 0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
                 1.          1.          1.          1.          1.          1.          2.          2.          2.          2.
                 2.          2.          3.          3.          3.          3.          3.          3.          3.          3.
```

```
         3.         3.         3.         3.         3.         3.         2.         2.         2.         2.
         2.         2.         2.         2.         2.         2.         2.         2.         2.         2.
         1.         1.         1.         1.         1.         1.         1.         1.         1.         1.
         1.         1.         1.         1.         1.         1.         1.         1.         1.         1.
         1.         1.         1.         1.         1.         1.         1.         1.         1.         1.
         1.         1.         1.         1.         1.         1.         1.         1.         1.         1.
         1.         1.         1.         1.         1.         1.         1.         2.         2.         2.
         3.         3.         4.         5.         6.         7.         9.        10.        11.        12.
        13.        14.        15.        17.        18.        19.        19.        20.        21.        21.
        22.        23.        23.        23.        24.        24.        24.        25.        25.        26.
        28.        31.        35.        40.        46.        54.        64.        74.        85.        96.
       107.       119.       131.       146.       165.       179.       189.       198.       209.       223.
       239.       274.       359.       440.       463.       480.      2158.      4118.      2268.       369.
       445.       401.       381.       374.       345.       334.       307.       289.       264.       242.
       218.       195.       174.       156.       139.       124.       111.        99.        89.        79.
        71.        64.        58.        52.        48.        46.        44.        42.        40.        38.
        36.        35.        33.        32.        30.        29.        27.        26.        25.        24.
        23.        22.        21.        20.        19.        18.        17.        16.        16.        15.
                                                     STOR
         0.         0.         0.         0.         0.         0.         0.         0.         0.         0.
         0.         0.         0.         0.         0.         0.         0.         0.         0.         0.
         0.         0.         0.         0.         0.         0.         0.         0.         0.         0.
         0.         0.         0.         0.         0.         0.         0.         0.         0.         0.
         0.         0.         0.         0.         0.         0.         0.         0.         0.         0.
         0.         0.         0.         0.         0.         0.         0.         0.         0.         0.
         0.         0.         0.         0.         0.         0.         0.         0.         0.         0.
         0.         0.         0.         0.         0.         0.         0.         0.         0.         0.
         0.         0.         0.         0.         0.         0.         0.         0.         0.         0.
         0.         0.         0.         0.         0.         0.         0.         0.         0.         0.
         0.         0.         0.         0.         0.         0.         0.         0.         0.         0.
         0.         0.         0.         0.         0.         0.         0.         0.         0.         0.
         0.         0.         0.         0.         0.         0.         0.         0.         0.         0.
         0.         0.         0.         0.         0.         0.         0.         0.         0.         0.
         0.         0.         0.         0.         0.         0.         0.         0.         0.         0.
         0.         0.         0.         0.         0.         0.         0.         0.         0.         0.
         0.         0.         0.         0.         0.         0.         0.         0.         0.         0.
         0.         0.         0.         0.         0.         0.         0.         0.         0.         0.
         0.         0.         0.         0.         0.         0.         0.         0.         0.         0.
         0.         0.         0.         0.         0.         0.         0.         0.         0.         0.
         0.         0.         0.         0.         0.         0.         0.         0.         0.         0.
         0.         0.         0.         0.         0.         0.         0.         0.         0.         0.
         0.         0.         0.         0.         0.         0.         0.         0.         0.         0.
         0.         0.         0.         0.         0.         0.         0.         0.         0.         0.
         0.         1.         1.         1.         1.         1.         4.         8.         5.         1.
         1.         1.         1.         1.         1.         1.         1.         1.         1.         0.
         0.         0.         0.         0.         0.         0.         0.         0.         0.         0.
         0.         0.         0.         0.         0.         0.         0.         0.         0.         0.
         0.         0.         0.         0.         0.         0.         0.         0.         0.         0.
         0.         0.         0.         0.         0.         0.         0.         0.         0.         0.
```

```
                                             STAGE
      1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
      1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
      1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
      1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
      1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
      1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
      1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
      1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
      1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
      1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
      1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
      1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
      1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
      1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
      1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
      1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
      1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
      1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
      1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
      1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.1    1409.1    1409.1
      1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1
      1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1
      1409.1    1409.2    1409.2    1409.2    1409.2    1409.3    1409.3    1409.4    1409.4    1409.5
      1409.5    1409.6    1409.7    1409.7    1409.8    1409.9    1410.0    1410.0    1410.1    1410.1
      1410.2    1410.4    1410.8    1411.2    1411.4    1411.4    1413.7    1414.9    1413.6    1410.9
      1411.3    1411.0    1410.9    1410.9    1410.8    1410.7    1410.6    1410.5    1410.3    1410.2
      1410.1    1410.0    1409.9    1409.8    1409.7    1409.6    1409.6    1409.5    1409.5    1409.4
      1409.4    1409.3    1409.3    1409.3    1409.2    1409.2    1409.2    1409.2    1409.2    1409.2
      1409.2    1409.2    1409.2    1409.2    1409.2    1409.1    1409.1    1409.1    1409.1    1409.1
      1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1

                              PEAK    6-HOUR    24-HOUR    72-HOUR    TOTAL VOLUME
                     CFS     4118.     478.       136.        66.          19757.
                     CMS      117.      14.         4.         2.            559.
                  INCHES              11.65      13.29      13.36           13.36
                      MM             295.85     337.53     339.46          339.46
                   AC-FT               237.       271.       272.            272.
               THOUS CU M              293.       334.       336.            336.

                                    MAXIMUM STORAGE =        6.

 MAXIMUM STAGE IS     1414.9

                                    STATION     400, PLAN 2, RTIO 1

                                             OUTFLOW
          0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
          0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
          0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
```

```
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        1.        1.        1.        1.        1.        1.        2.        2.        2.        2.
        2.        2.        3.        3.        3.        3.        3.        3.        3.        3.
        3.        3.        3.        3.        3.        3.        2.        2.        2.        2.
        2.        2.        2.        2.        2.        2.        2.        2.        2.        2.
        1.        1.        1.        1.        1.        1.        1.        1.        1.        1.
        1.        1.        1.        1.        1.        1.        1.        1.        1.        1.
        1.        1.        1.        1.        1.        1.        1.        1.        1.        1.
        1.        1.        1.        1.        1.        1.        1.        1.        1.        1.
        1.        1.        1.        1.        1.        1.        1.        2.        2.        2.
        3.        3.        4.        5.        6.        7.        9.       10.       11.       12.
       13.       14.       15.       17.       18.       19.       19.       20.       21.       21.
       22.       23.       23.       23.       24.       24.       24.       25.       25.       26.
       28.       31.       35.       40.       46.       54.       64.       74.       85.       96.
      107.      119.      131.      146.      165.      179.      189.      198.      209.      223.
      239.      274.      359.      440.      463.      480.      662.     1098.     1433.     1515.
     1491.     1312.     1052.      907.      765.      575.      487.      393.      268.      236.
      222.      192.      176.      454.      140.      124.      111.       99.       89.       80.
       71.       64.       57.       52.       48.       46.       44.       42.       40.       38.
       36.       35.       33.       32.       30.       29.       27.       26.       25.       24.
       23.       22.       21.       20.       19.       18.       17.       16.       16.       15.

                                              STOR
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
```

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	1.	1.	1.	1.	1.	1.	2.	3.	3.
3.	3.	2.	2.	2.	1.	1.	1.	1.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STAGE

1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.1	1409.1	1409.1
1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1
1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1
1409.1	1409.2	1409.2	1409.2	1409.2	1409.3	1409.3	1409.4	1409.4	1409.5
1409.5	1409.6	1409.7	1409.7	1409.8	1409.9	1410.0	1410.0	1410.1	1410.1
1410.2	1410.4	1410.8	1411.2	1411.4	1411.4	1411.8	1412.4	1412.8	1412.9
1412.8	1412.6	1412.3	1412.1	1412.0	1411.7	1411.5	1411.0	1410.4	1410.2
1410.1	1410.0	1409.9	1409.8	1409.7	1409.6	1409.6	1409.5	1409.5	1409.4
1409.4	1409.3	1409.3	1409.3	1409.2	1409.2	1409.2	1409.2	1409.2	1409.2
1409.2	1409.2	1409.2	1409.2	1409.2	1409.1	1409.1	1409.1	1409.1	1409.1
1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1515.	476.	136.	56.	19663.
CMS	43.	13.	4.	2.	557.
INCHES		11.58	13.22	13.30	13.30
MM		294.22	335.91	337.83	337.83
AC-FT		236.	269.	271.	271.
THOUS CU M		291.	332.	334.	334.

MAXIMUM STORAGE =

```
                                   [illegible]

MAXIMUM STAGE IS     1412.9

                                STATION    400, PLAN 3, RTIO 1

                                          OUTFLOW
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        1.        1.        1.        1.        1.        1.        2.        2.        2.        2.
        2.        2.        3.        3.        3.        3.        3.        3.        3.        3.
        3.        3.        3.        3.        3.        3.        2.        2.        2.        2.
        2.        2.        2.        2.        2.        2.        2.        2.        2.        2.
        1.        1.        1.        1.        1.        1.        1.        1.        1.        1.
        1.        1.        1.        1.        1.        1.        1.        1.        1.        1.
        1.        1.        1.        1.        1.        1.        1.        1.        1.        1.
        1.        1.        1.        1.        1.        1.        1.        1.        1.        1.
        1.        1.        1.        1.        1.        1.        1.        2.        2.        2.
        3.        3.        4.        5.        6.        7.        9.       10.       11.       12.
       13.       14.       15.       17.       18.       19.       19.       20.       21.       21.
       22.       23.       23.       23.       24.       24.       24.       25.       25.       26.
       26.       31.       35.       40.       46.       54.       64.       74.       85.       96.
      107.      119.      131.      146.      165.      179.      189.      198.      209.      223.
      239.      274.      359.      440.      463.      480.      533.      612.      716.      805.
      623.      846.      870.      840.      791.      766.      747.      670.      565.      556.
      521.      446.      366.      367.      333.      279.      250.      239.      203.      156.
      143.      138.       96.       58.       62.       67.       51.       41.       38.       40.
       35.       35.       33.       31.       30.       29.       28.       26.       25.       24.
       23.       22.       21.       20.       19.       18.       17.       16.       16.       15.

                                           STOR
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
        0.        0.        0.        0.        0.        0.        0.        0.         .        0.
        0.        0.        0.        0.        0.        0.        0.        0.         .        0.
        0.        0.        0.        0.        0.        0.        0.        0.         .        0.
         .         .         .        1.         .         .         .         .         .         .
```

```
      0.           0.           0.           0.           0.           0.           0.           0.           0.           0.
      0.           0.           0.           0.           0.           0.           0.           0.           0.           0.
      0.           0.           0.           0.           0.           0.           0.           0.           0.           0.
      0.           0.           0.           0.           0.           0.           0.           0.           0.           0.
      0.           0.           0.           0.           0.           0.           0.           0.           0.           0.
      0.           0.           0.           0.           0.           0.           0.           0.           0.           0.
      0.           0.           0.           0.           0.           0.           0.           0.           0.           0.
      0.           0.           0.           0.           0.           0.           0.           0.           0.           0.
      0.           0.           0.           0.           0.           0.           0.           0.           0.           0.
      0.           0.           0.           0.           0.           0.           0.           0.           0.           0.
      0.           0.           0.           0.           0.           0.           0.           0.           0.           0.
      0.           1.           1.           1.           1.           1.           1.           1.           1.           2.
      2.           2.           2.           2.           2.           2.           2.           1.           1.           1.
      1.           1.           1.           1.           1.           1.           1.           0.           0.           0.
      0.           0.           0.           0.           0.           0.           0.           0.           0.           0.
      0.           0.           0.           0.           0.           0.           0.           0.           0.           0.
      0.           0.           0.           0.           0.           0.           0.           0.           0.           0.

                                                       STAGE
 1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0
 1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0
 1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0
 1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0
 1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0
 1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0
 1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0
 1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0
 1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0
 1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0
 1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0
 1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0
 1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0
 1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0
 1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0
 1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0
 1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0
 1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0
 1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0
 1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.0       1409.1       1409.1       1409.1
 1409.1       1409.1       1409.1       1409.1       1409.1       1409.1       1409.1       1409.1       1409.1       1409.1
 1409.1       1409.1       1409.1       1409.1       1409.1       1409.1       1409.1       1409.1       1409.1       1409.1
 1409.1       1409.2       1409.2       1409.2       1409.2       1409.3       1409.3       1409.4       1409.4       1409.5
 1409.5       1409.6       1409.7       1409.7       1409.8       1409.9       1410.0       1410.0       1410.1       1410.1
 1410.2       1410.4       1410.8       1411.2       1411.4       1411.4       1411.7       1411.8       1411.9       1412.0
 1412.0       1412.1       1412.1       1412.1       1412.0       1412.0       1411.9       1411.9       1411.8       1411.7
 1411.7       1411.3       1411.0       1410.9       1410.7       1410.4       1410.3       1410.2       1410.0       1409.8
 1409.7       1409.7       1409.5       1409.3       1409.3       1409.3       1409.3       1409.2       1409.2       1409.2
 1409.2       1409.2       1409.2       1409.2       1409.2       1409.1       1409.1       1409.1       1409.1       1409.1
 1409.1       1409.1       1409.1       1409         1409.1       1409.1       1409.1       1409.1       1409.1       1409.1

                            PEAK     6-HOUR    24-HOUR    72-HOUR    TOTAL VOLUME
```

```
                  CFS      670.      465.      136.       66.            19661.
                  CMS       25.       13.        4.        2.              557.
               INCHES                11.33     13.22     13.30            13.30
                   MM               287.88    335.88    337.81           337.81
                AC-FT                 231.      269.      271.             271.
          THOUS CU M                  285.      332.      334.             334.

                         MAXIMUM STORAGE =        2.

MAXIMUM STAGE IS    1412.1

                         STATION     400, PLAN 4, RTIO 1

                                    OUTFLOW
          0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
          0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
          0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
          0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
          0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
          0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
          0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
          0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
          0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
          0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
          1.        1.        1.        1.        1.        1.        2.        2.        2.        2.
          2.        2.        3.        3.        3.        3.        3.        3.        3.        3.
          3.        3.        3.        3.        3.        3.        2.        2.        2.        2.
          2.        2.        2.        2.        2.        2.        2.        2.        2.        2.
          1.        1.        1.        1.        1.        1.        1.        1.        1.        1.
          1.        1.        1.        1.        1.        1.        1.        1.        1.        1.
          1.        1.        1.        1.        1.        1.        1.        1.        1.        1.
          1.        1.        1.        1.        1.        1.        1.        1.        1.        1.
          1.        1.        1.        1.        1.        1.        1.        2.        2.        2.
          3.        3.        4.        5.        6.        7.        9.       10.       11.       12.
         13.       14.       15.       17.       18.       19.       19.       20.       21.       21.
         22.       23.       23.       23.       24.       24.       24.       25.       25.       26.
         28.       31.       35.       40.       46.       54.       64.       74.       85.       96.
        107.      119.      131.      146.      165.      179.      189.      198.      209.      223.
        239.      274.      359.      440.      463.      479.     3011.     4132.      910.      288.
        578.      274.      475.      319.      362.      314.      313.      288.      259.      246.
        211.      200.      169.      158.      135.      126.      159.      100.       67.       80.
         70.       64.       57.       52.       48.       46.       44.       42.       40.       38.
         36.       35.       33.       31.       30.       29.       27.       26.       25.       24.
         23.       22.       21.       20.       19.       18.       17.       16.       16.       15.

                                     STOR
          0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
          0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
          0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
          0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
```

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	1.	1.	1.	1.	1.	6.	8.	2.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STAGE

1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.	1409.0	1409.0	1409.0	1409.0	1409.0	1409.1	1409.1	1409.1
1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1
1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1
1409.1	1409.2	1409.2	1409.2	1409.2	1409.3	1409.3	1409.4	1409.4	1409.5

```
  1409.5    1409.6    1409.7    1409.7    1409.8    1409.9    1410.0    1410.0    1410.1    1410.1
  1410.2    1410.4    1410.8    1411.2    1411.4    1411.4    1414.5    1414.9    1412.1    1410.5
  1411.7    1410.4    1411.4    1410.6    1410.9    1410.6    1410.6    1410.5    1410.3    1410.3
  1410.1    1410.3    1409.9    1409.8    1409.7    1409.6    1409.6    1409.5    1409.4    1409.4
  1409.4    1409.3    1409.3    1409.3    1409.2    1409.2    1409.2    1409.2    1409.2    1409.2
  1409.2    1409.2    1409.2    1409.2    1409.2    1409.1    1409.1    1409.1    1409.1    1409.1
  1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1

                          PEAK    6-HOUR   24-HOUR   72-HOUR   TOTAL VOLUME
                CFS      4132.      464.      133.       64.         19232.
                CMS       117.       13.        4.        2.           545.
             INCHES                11.29     12.93     13.01          13.01
                 MM               286.89    328.51    330.43         330.43
              AC-FT                 230.      263.      265.           265.
         THOUS CU M                 284.      325.      327.           327.

                               MAXIMUM STORAGE =        8.

MAXIMUM STAGE IS    1414.9

                               STATION     4[illegible], PLAN 5, RTIO 1

                                         OUTFLOW
       0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
       0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
       0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
       0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
       0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
       0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
       0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
       0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
       0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
       0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
       1.        1.        1.        1.        1.        1.        2.        2.        2.        2.
       2.        2.        3.        3.        3.        3.        3.        3.        3.        3.
       3.        3.        3.        3.        3.        3.        2.        2.        2.        2.
       2.        2.        2.        2.        2.        2.        2.        2.        2.        2.
       1.        1.        1.        1.        1.        1.        1.        1.        1.        1.
       1.        1.        1.        1.        1.        1.        1.        1.        1.        1.
       1.        1.        1.        1.        1.        1.        1.        1.        1.        1.
       1.        1.        1.        1.        1.        1.        1.        2.        2.        2.
       3.        3.        4.        5.        6.        7.        9.       10.       11.       12.
      13.       14.       15.       17.       18.       19.       19.       20.       21.       21.
      22.       23.       23.       23.       24.       24.       24.       25.       25.       26.
      28.       31.       35.       40.       46.       54.       64.       74.       85.       96.
    1[illegible].      119.      131.      146.      165.      179.      189.      198.      259.      223.
     239.      274.      359.      440.      463.      479.      975.     1640.     16[illegible]1.     1481.
    13[illegible].     1009.      923.      760.      666.      580.      360.      279.      30[illegible].      233.
     [illegible]14.      [illegible].      167.      158.      136.      124.      11[illegible].       99.      [illegible].       79.
```

```
      71.         63.         56.         51.         48.         46.         44.         42.         40.         38.
      36.         35.         33.         31.         30.         29.         27.         26.         25.         24.
      23.         22.         21.         20.         19.         18.         17.         16.         16.         15.

                                                     STOR
       0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
       0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
       0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
       0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
       0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
       0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
       0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
       0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
       0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
       0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
       0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
       0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
       0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
       0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
       0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
       0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
       0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
       0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
       0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
       0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
       0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
       0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
       0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
       0.          1.          1.          1.          1.          1.          2.          3.          3.          3.
       3.          2.          2.          2.          1.          1.          1.          1.          1.          0.
       0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
       0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
       0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
       0.          0.          0.          0.          0.          0.          0.          0.          0.          0.

                                                     STAGE
  1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0
  1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0
  1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0
  1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0
  1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0
  1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0
  1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0
  1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0
  1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0
  1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0
  1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0
  1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0
  1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0
```

```
  1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
  1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
  1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
  1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
  1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
  1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.1    1409.1    1409.1
  1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1
  1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1
  1409.1    1409.2    1409.2    1409.2    1409.2    1409.3    1409.3    1409.4    1409.4    1409.5
  1409.5    1409.6    1409.7    1409.7    1409.8    1409.9    1410.0    1410.0    1410.1    1410.1
  1410.2    1410.4    1410.8    1411.2    1411.4    1411.4    1412.2    1413.0    1413.0    1412.8
  1412.6    1412.3    1412.2    1412.0    1411.9    1411.7    1410.8    1410.4    1410.5    1410.2
  1410.1    1410.0    1409.9    1409.8    1409.7    1409.6    1409.6    1409.5    1409.5    1409.4
  1409.4    1409.3    1409.3    1409.3    1409.2    1409.2    1409.2    1409.2    1409.2    1409.2
  1409.2    1409.2    1409.2    1409.2    1409.2    1409.1    1409.1    1409.1    1409.1    1409.1
  1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1

                             PEAK   6-HOUR   24-HOUR   72-HOUR   TOTAL VOLUME
                     CFS    1640.     473.      135.       65.        19574.
                     CMS      46.      13.        4.        2.          554.
                  INCHES             11.53     13.16     13.24         13.24
                      MM            292.77    334.38    336.31        336.31
                   AC-FT              235.      268.      270.          270.
              THOUS CU M              290.      331.      333.          333.

                             MAXIMUM STORAGE =        3.

MAXIMUM STAGE IS    1413.0

                             STATION     400, PLAN 6, RTIO 1

                                          OUTFLOW
          0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
          0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
          0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
          0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
          0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
          0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
          0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
          0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
          0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
          0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
          1.        1.        1.        1.        1.        1.        2.        2.        2.        2.
          2.        2.        3.        3.        3.        3.        3.        3.        3.        3.
          3.        3.        3.        3.        3.        3.        2.        2.        2.        2.
          2.        2.        2.        2.        2.        2.        2.        2.        2.        2.
          1.        1.        1.        1.        1.        1.        1.        1.        1.        1.
          1.        1.        1.        1.        1.        1.        1.        1.        1.        1.
          1.        1.        1.        1.        1.        1.        1.        1.        1.        1.
          1.        1.        1.        1.        1.        1.        1.        1.        1.        1
```

```
        1.          1.          1.          1.          1.          1.          1.          2.          2.          2.
        3.          3.          4.          5.          6.          7.          9.         10.         11.         12.
       13.         14.         15.         17.         18.         19.         19.         20.         21.         21.
       22.         23.         23.         23.         24.         24.         24.         25.         25.         26.
       29.         31.         35.         40.         46.         54.         64.         74.         85.         96.
      107.        119.        131.        146.        165.        179.        189.        198.        209.        223.
      259.        274.        359.        440.        463.        479.        692.        833.        947.        922.
      920.        880.        810.        790.        773.        702.        615.        585.        567.        504.
      430.        397.        382.        339.        286.        257.        249.        227.        182.        146.
      143.        137.        106.         73.         68.         67.         54.         41.         37.         40.
       34.         35.         33.         31.         31.         28.         28.         26.         25.         24.
       23.         22.         21.         20.         19.         18.         17.         16.         16.         15.

                                                   STOR
        0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
        0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
        0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
        0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
        0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
        0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
        0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
        0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
        0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
        0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
        0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
        0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
        0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
        0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
        0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
        0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
        0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
        0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
        0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
        0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
        0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
        0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
        0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
        0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
        0.          1.          1.          1.          1.          1.          1.          2.          2.          2.
        2.          2.          2.          2.          2.          1.          1.          1.          1.          1.
        1.          1.          1.          1.          1.          1.          1.          0.          0.          0.
        0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
        0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
        0.          0.          0.          0.          0.          0.          0.          0.          0.          0.

                                                   STAGE
   1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0
   1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0
   1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0
   1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0
   1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0      1409.0
```

```
 1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
 1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
 1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
 1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
 1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
 1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
 1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
 1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
 1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
 1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
 1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
 1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
 1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
 1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0
 1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.0    1409.1    1409.1    1409.1
 1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1
 1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1
 1409.1    1409.2    1409.2    1409.2    1409.2    1409.3    1409.3    1409.4    1409.4    1409.5
 1409.5    1409.6    1409.7    1409.7    1409.8    1409.9    1410.0    1410.0    1410.1    1410.1
 1410.2    1410.4    1410.8    1411.2    1411.4    1411.4    1411.8    1412.1    1412.2    1412.2
 1412.2    1412.1    1412.0    1412.0    1412.0    1411.9    1411.8    1411.5    1411.7    1411.6
 1411.2    1411.0    1410.9    1410.7    1410.5    1410.3    1410.3    1410.2    1409.9    1409.7
 1409.7    1409.7    1409.5    1409.4    1409.3    1409.3    1409.3    1409.2    1409.2    1409.2
 1409.2    1409.2    1409.2    1409.2    1409.2    1409.1    1409.1    1409.1    1409.1    1409.1
 1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1    1409.1

                         PEAK    6-HOUR   24-HOUR   72-HOUR    TOTAL VOLUME
               CFS        947.      466.      136.       66.         19689.
               CMS         27.       13.        4.        2.           558.
            INCHES                 11.34     13.24     13.32          13.32
                MM                287.97    336.36    338.29         338.29
             AC-FT                  231.      270.      271.           271.
       THOUS CU M                   285.      333.      335.           335.

                                MAXIMUM STORAGE =         2.

MAXIMUM STAGE IS    1412.2

                                STATION     400, PLAN 7, RTIO 1

                                                 OUTFLOW
         0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
         0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
         0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
         0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
         0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
         0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
         0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
         0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
         0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
```

[illegible]	0.	[illegible]	[illegible]	0.	0.	0.	0.	[illegible]	0.
1.	1.	1.	1.	1.	1.	2.	2.	2.	2.
2.	2.	3.	3.	3.	3.	3.	3.	3.	3.
3.	3.	3.	3.	3.	3.	2.	2.	2.	2.
2.	2.	2.	2.	2.	2.	2.	2.	2.	2.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	2.	2.	2.
3.	3.	4.	5.	6.	7.	9.	10.	11.	12.
13.	14.	15.	17.	18.	19.	19.	20.	21.	21.
22.	23.	23.	23.	24.	24.	24.	25.	25.	26.
[illegible]	31.	35.	40.	46.	54.	64.	74.	85.	96.
137.	119.	131.	146.	165.	179.	189.	198.	209.	223.
239.	274.	359.	440.	465.	481.	3071.	3931.	678.	358.
572.	258.	493.	293.	393.	307.	316.	287.	255.	247.
211.	201.	168.	159.	134.	126.	128.	100.	87.	80.
71.	64.	57.	52.	47.	46.	44.	42.	40.	38.
36.	35.	33.	31.	30.	29.	27.	26.	25.	24.
23.	22.	21.	20.	19.	18.	17.	16.	16.	15.

STOK

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
[illegible]	1.	1.	1.	1.	1.	6.	8.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
[illegible]	7.	[illegible]	[illegible]	[illegible]	[illegible]	0.	[illegible]	[illegible]	[illegible]

STAGE

1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.1
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.1
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.1	1409.1	1409.1
1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1
1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1
1409.1	1409.2	1409.2	1409.2	1409.2	1409.3	1409.3	1409.4	1409.4	1409.5
1409.5	1409.6	1409.7	1409.7	1409.8	1409.9	1410.0	1410.0	1410.1	1410.1
1410.2	1410.4	1410.8	1411.2	1411.4	1411.5	1414.5	1414.9	1411.9	1410.8
1411.7	1410.3	1411.5	1410.5	1411.0	1410.6	1410.6	1410.5	1410.3	1410.3
1410.1	1410.0	1409.9	1409.8	1409.7	1409.6	1409.6	1409.5	1409.4	1409.4
1409.4	1409.3	1409.3	1409.3	1409.2	1409.2	1409.2	1409.2	1409.2	1409.2
1409.2	1409.2	1409.2	1409.2	1409.2	1409.1	1409.1	1409.1	1409.1	1409.1
1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3931.	455.	131.	63.	18917.
CMS	111.	13.	4.	2.	536.
INCHES		11.08	12.72	12.80	12.80
MM		281.49	323.10	325.03	325.03
AC-FT		226.	259.	261.	261.
THOUS CU M		278.	320.	321.	321.

MAXIMUM STORAGE = 2.

MAXIMUM STAGE IS 1414.9

STATION 4[illegible] PLAN 6, RTIO 1

[illegible]

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1.	1.	1.	1.	1.	1.	2.	2.	2.	2.
2.	2.	3.	3.	3.	3.	3.	3.	3.	3.
3.	3.	3.	3.	3.	3.	2.	2.	2.	2.
2.	2.	2.	2.	2.	2.	2.	2.	2.	2.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	2.	2.	2.
3.	3.	4.	5.	6.	7.	9.	10.	11.	12.
13.	14.	15.	17.	18.	19.	19.	20.	21.	21.
22.	23.	23.	23.	24.	24.	24.	25.	25.	26.
28.	31.	35.	40.	46.	54.	64.	74.	85.	96.
[illegible]	119.	131.	146.	165.	179.	189.	198.	209.	223.
239.	274.	359.	440.	465.	481.	[illegible]	1795.	[illegible]	1417.
[illegible]	[illegible]	[illegible]	766.	633.	544.	[illegible]	312.	[illegible]	233.
215.	199.	169.	158.	136.	125.	110.	99.	88.	79.
71.	63.	57.	51.	47.	46.	44.	41.	40.	38.
36.	35.	33.	32.	30.	29.	27.	26.	25.	24.
23.	22.	21.	20.	19.	18.	17.	16.	16.	15.
				STOR					
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	1.	1.	1.	1.	1.	2.	4.	3.	3.
3.	2.	2.	2.	1.	1.	1.	1.	1.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STAGE

1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.1	1409.1	1409.1
1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1
1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1
1409.1	1409.2	1409.2	1409.2	1409.2	1409.3	1409.3	1409.4	1409.4	1409.5
1409.5	1409.6	1409.7	1409.7	1409.8	1409.9	1410.0	1410.0	1410.1	1410.1
1410.2	1410.4	1410.8	1411.2	1411.4	1411.5	1412.4	1413.2	1413.0	1412.8
1412.6	1412.2	1412.1	1412.0	1411.8	1411.7	1411.1	1410.6	1410.5	1410.2
1411.1	1410.[illegible]	1409.9	1409.8	1409.7	1409.6	1409.6	1409.5	1409.4	1409.4
1409.4	1409.3	1409.3	1409.3	1409.2	1409.2	1409.2	1409.2	1409.2	1409.2
1409.2	1409.2	1409.2	1409.2	1409.2	1409.1	1409.1	1409.1	1409.1	1409.1
1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1	1409.1

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1795.	476.	136.	66.	19654.
CMS	51.	13.	4.	2.	557.
INCHES		11.58	13.22	13.29	13.29
MM		294.14	335.75	337.68	337.68
AC-FT		236.	269.	271.	271.
THOUS CU M		291.	332.	334.	334.

```
                                    MAXIMUM STORAGE =        4.

MAXIMUM STAGE IS    1413.2

                                    STATION     400, PLAN 9, RTIO 1

                                                OUTFLOW
          0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
          0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
          0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
          0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
          0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
          0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
          0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
          0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
          0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
          0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
          1.          1.          1.          1.          1.          1.          2.          2.          2.          2.
          2.          2.          3.          3.          3.          3.          3.          3.          3.          3.
          3.          3.          3.          3.          3.          3.          2.          2.          2.          2.
          2.          2.          2.          2.          2.          2.          2.          2.          2.          2.
          1.          1.          1.          1.          1.          1.          1.          1.          1.          1.
          1.          1.          1.          1.          1.          1.          1.          1.          1.          1.
          1.          1.          1.          1.          1.          1.          1.          1.          1.          1.
          1.          1.          1.          1.          1.          1.          1.          1.          1.          1.
          1.          1.          1.          1.          1.          1.          1.          2.          2.          2.
          3.          3.          4.          5.          6.          7.          9.         10.         11.         12.
         13.         14.         15.         17.         18.         19.         19.        -20.         21.         21.
         22.         23.         23.         23.         24.         24.         24.         25.         25.         26.
         28.         31.         35.         40.         46.         54.         64.         74.         85.         96.
        107.        119.        131.        146.        165.        179.        189.        198.        209.        223.
        239.        274.        359.        440.        465.        481.        656.        920.        969.        941.
        928.        856.        798.        787.        772.        683.        594.        586.        565.        481.
        410.        399.        381.        316.        264.        260.        249.        207.        165.        149.
        145.        131.        111.         84.         73.         68.         57.         41.         37.         41.
         34.         35.         32.         31.         31.         28.         28.         26.         25.         24.
         23.         22.         21.         20.         19.         18.         17.         16.         16.         15.

                                                 STOR
          0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
          0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
          0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
          0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
          0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
          0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
          0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
          0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
          0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
          0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
```

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	1.	1.	1.	1.	1.	1.	2.	2.	2.
2.	2.	2.	2.	2.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STAGE

1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0	1409.0
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1409.1	1409.2	1409.2	1409.2	1409.2	1409.3	1409.3	1409.4	1409.4	1409.5
1409.5	1409.6	1409.7	1409.7	1409.8	1409.9	1410.0	1410.0	1410.1	1410.1
1410.2	1410.4	1410.8	1411.2	1411.4	1411.5	1411.8	1412.2	1412.2	1412.2
1412.2	1412.1	1412.0	1412.0	1412.0	1411.9	1411.8	1411.8	1411.7	1411.5
1411.1	1411.0	1410.9	1410.6	1410.3	1410.3	1410.3	1410.1	1409.8	1409.5
1409.7	1409.7	1409.6	1409.4	1409.4	1409.3	1409.3	1409.2	1409.2	1409.2
[illegible]	1409.2	1409.2	1409.2	1409.2	1409.1	1409.1	1409.1	1409.1	1409.1

1409.1 1409.1 1409.1 1409.1 1409.1 1409.1 1409.1 1409.1 1409.1 1409.1

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	969.	465.	136.	66.	19699.
CMS	27.	13.	4.	2.	558.
INCHES		11.33	13.25	13.33	13.33
MM		287.77	336.53	338.46	338.46
AC-FT		231.	270.	271.	271.
THOUS CU M		285.	333.	335.	335.

MAXIMUM STORAGE = 2.

MAXIMUM STAGE IS 1412.2

********** ********** ********** ********** **********

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIO 1
				0.50
HYDROGRAPH AT	100	0.38	1	490.
		(0.99)		(13.89)
			2	490.
				(13.89)
			3	490.
				(13.89)
			4	490.
				(13.89)
			5	490.
				(13.89)
			6	490.
				(13.89)
			7	490.
				(13.89)
			8	490.
				(13.89)
			9	490.
				(13.89)
ROUTED TO	1[illegible]	0.38	1	3900.
		(0.99)		(110.45)
			2	1514.
				(42.88)
			3	874.
				(24.75)
			4	4663.
				(132.03)
			5	1634.
				(46.26)
			6	939.
				(26.60)
			7	4761.
				(134.80)
			8	1713.
				(48.50)
			9	964.
				(27.29)

RATIOS APPLIED TO FLOWS

ROUTED TO	200	0.38	1	4085.
	(	0.99)	(	115.68)(
			2	1516.
			(	42.98)(
			3	867.
			(	24.56)(
			4	4147.
			(	117.42)(
			5	1672.
			(	47.34)(
			6	938.
			(	26.56)(
			7	4232.
			(	119.84)(
			8	1784.
			(	50.51)(
			9	955.
			(	27.04)(
ROUTED TO	300	0.38	1	4178.
	(	0.99)	(	118.30)(
			2	1519.
			(	43.01)(
			3	868.
			(	24.58)(
			4	3732.
			(	105.69)(
			5	1693.
			(	47.93)(
			6	943.
			(	26.72)(
			7	3808.
			(	107.84)(
			8	1826.
			(	51.69)(
			9	954.
			(	27.01)(
ROUTED TO	400	0.38	1	4118.
	(	0.99)	(	116.60)(
			2	1515.
			(	42.90)(
			3	870.
			(	24.63)(
			4	4132.
			(	117.02)(
			5	1640.
			(	46.43)(
			6	947.
			(	26.80)(
			7	3931.

(111.30)(
8   1795.
(50.82)(
9   969.
(27.44)(

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1507.30	1507.30	1510.00
STORAGE	77.	77.	95.
OUTFLOW	0.	0.	255.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	1510.23	0.28	97.	4290.	0.89	41.28	41.00

PLAN 2 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1507.30	1507.30	1510.00
STORAGE	77.	77.	95.
OUTFLOW	0.	0.	255.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	1510.28	0.28	97.	1548.	1.00	41.58	41.00

PLAN 3 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1507.30	1507.30	1510.00
STORAGE	77.	77.	95.
OUTFLOW	0.	0.	255.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	1510.28	0.28	97.	874.	1.08	42.17	41.00

PLAN 4 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1507.30	1507.30	1510.00
STORAGE	77.	77.	95.
OUTFLOW	0.	0.	255.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	1510.26	0.28	97.	4672.	0.87	41.15	41.00

PLAN 5 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1507.30	1507.30	1510.00
STORAGE	77.	77.	95.
OUTFLOW	0.	0.	255.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	1510.28	0.28	97.	1696.	0.92	41.42	41.00

PLAN 6 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1507.30	1507.30	1510.00
STORAGE	77.	77.	95.
OUTFLOW	0.	0.	255.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	1510.28	0.28	97.	939.	1.00	41.50	41.00

PLAN 7 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1507.30	1507.30	1510.00
STORAGE	77.	77.	95.
OUTFLOW	0.	0.	255.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	1510.28	0.28	97.	4938.	0.86	41.13	41.00

PLAN 8 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1507.30	1507.30	1510.00
STORAGE	77.	77.	95.
OUTFLOW	0.	0.	255.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	1510.28	0.28	97.	1725.	0.92	41.37	41.00

PLAN 9 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1507.30	1507.30	1510.00

STORAGE	77.	77.	95.
OUTFLOW	0.	0.	255.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.50	1510.28	0.28	97.	964.	0.92	41.50	41.00

PLAN 1 STATION 200

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	4085.	1469.1	41.33

PLAN 2 STATION 200

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	1518.	1465.6	41.67

PLAN 3 STATION 200

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	867.	1464.1	42.17

PLAN 4 STATION 200

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	4147.	1469.2	41.17

PLAN 5 STATION 200

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	1672.	1465.9	41.33

PLAN 6 STATION 200

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	938.	1464.5	41.5[illegible]

PLAN 7 STATION 200

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	4232.	1469.3	41.17

PLAN 8 STATION 200

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	1784.	1466.2	41.33

PLAN 9 STATION 200

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	955.	1464.3	41.50

PLAN 1 STATION 300

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	4178.	1444.9	41.33

PLAN 2 STATION 300

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	1519.	1442.1	41.67

PLAN 3 STATION 300

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.50	868.	1441.3	42.17

PLAN 4 STATION 300

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	3732.	1444.6	41.17

PLAN 5 STATION 3[illegible]

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	1693.	1442.3	41.33

PLAN 6 STATION 300

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	943.	1441.4	41.50

PLAN 7 STATION 300

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	3808.	1444.7	41.17

PLAN 8 STATION 300

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	1826.	1442.5	41.33

PLAN 9 STATION 300

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	954.	1441.4	41.50

PLAN 1 STATION 400

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	4118.	1414.9	41.33

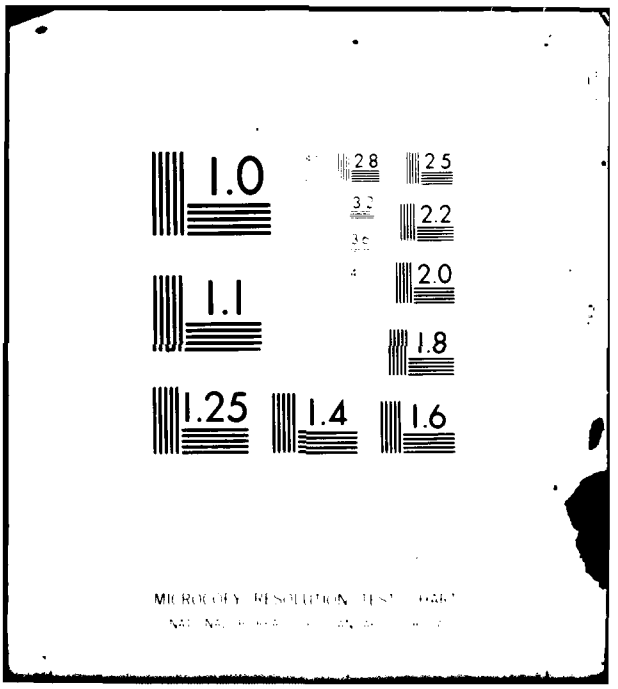
PLAN 2 STATION 400

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	1515.	1412.9	41.67

PLAN 3 STATION 400

MAXIMUM MAXIMUM TIME

AD-A109 800 STETSON-DALE UTICA NY F/G 13/13
NATIONAL DAM SAFETY PROGRAM. NEW WATERVILLE RESERVOIR DAM (INVE--ETC(U)
AUG 81 J B STETSON DACW51-81-C-0009
UNCLASSIFIED NL


1.0
2.8
2.5
3.2
2.2
3.6
4
2.0
1.1
1.8
1.25
1.4
1.6

RATIO	FLOW,CFS	STAGE,FT	HOURS
0.50	970.	1412.1	42.17

PLAN 4 STATION 400

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	4132.	1414.9	41.33

PLAN 5 STATION 400

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	1640.	1413.0	41.33

PLAN 6 STATION 400

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	947.	1412.2	41.5[illegible]

PLAN 7 STATION 400

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	3931.	1414.9	41.33

PLAN 8 STATION 400

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	1795.	1413.2	41.33

PLAN 9 STATION 400

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
0.50	909.	1412.2	41.50

APPENDIX D

REFERENCES

APPENDIX D

REFERENCES

1. Department of the Army, Office of the Chief of Engineers. National Program of Investigation of Dams; Appendix D: Recommended Guidelines for Safety Inspection of Dams, 1976

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11. Bureau of Reclamation, United States Department of the Interior, Design of Small Dams: A Water Resources Technical Publication, Third Printing, 1965

12. J.T. Riedel, J.F. Appleby and R.W. Schloemer: Hydrometeorological Report No. 33, U.S. Department of Commerce, U.S. Department of Army, Corps of Engineers, Washington, D.C., April 1956. Available from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C.

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14. Sherard, Woodward, Gizienski, Clevenger: Earth and Earth - Rock Dams, John Wiley and Sons, Inc., 1963.

15. U.S. Soil Conservation Service, Stillwater Outdoor Hydraulic Laboratory: Handbook of Channel Design for Soil and Water Conservation, SCS-TP-61, March 1974; revised June 1954.

16. The University of the State of New York - The State Education Department, State Museum and Science Service, Geological Survey: Geologic Map of New York, 1970

17. Y.W. Isachsen and W.G. McKendree, 1977, Preliminary Brittle Structures Map of New York, Hudson-Mohawk Sheet, New York State Museum Map and Chart Series No. 31B

APPENDIX E

PREVIOUS INSPECTION REPORTS/AVAILABLE DOCUMENTS

Form IWSI. 11-6-14-1000 (16-103a) Acc. 38a

(NOTICE: After filling out one of these forms as completely as possible for each dam in your district, return it at once to the Conservation Commission, Albany.)

STATE OF NEW YORK

CONSERVATION COMMISSION

ALBANY

Reservoir
Mark 116 - 833 ~~DAM~~ REPORT
Mob.

July 16 (Date), 1917

CONSERVATION COMMISSION,

DIVISION OF INLAND WATERS.

GENTLEMEN:

I have the honor to make the following report in relation to the structure known as the New Waterville Reservoir ~~Dam~~.

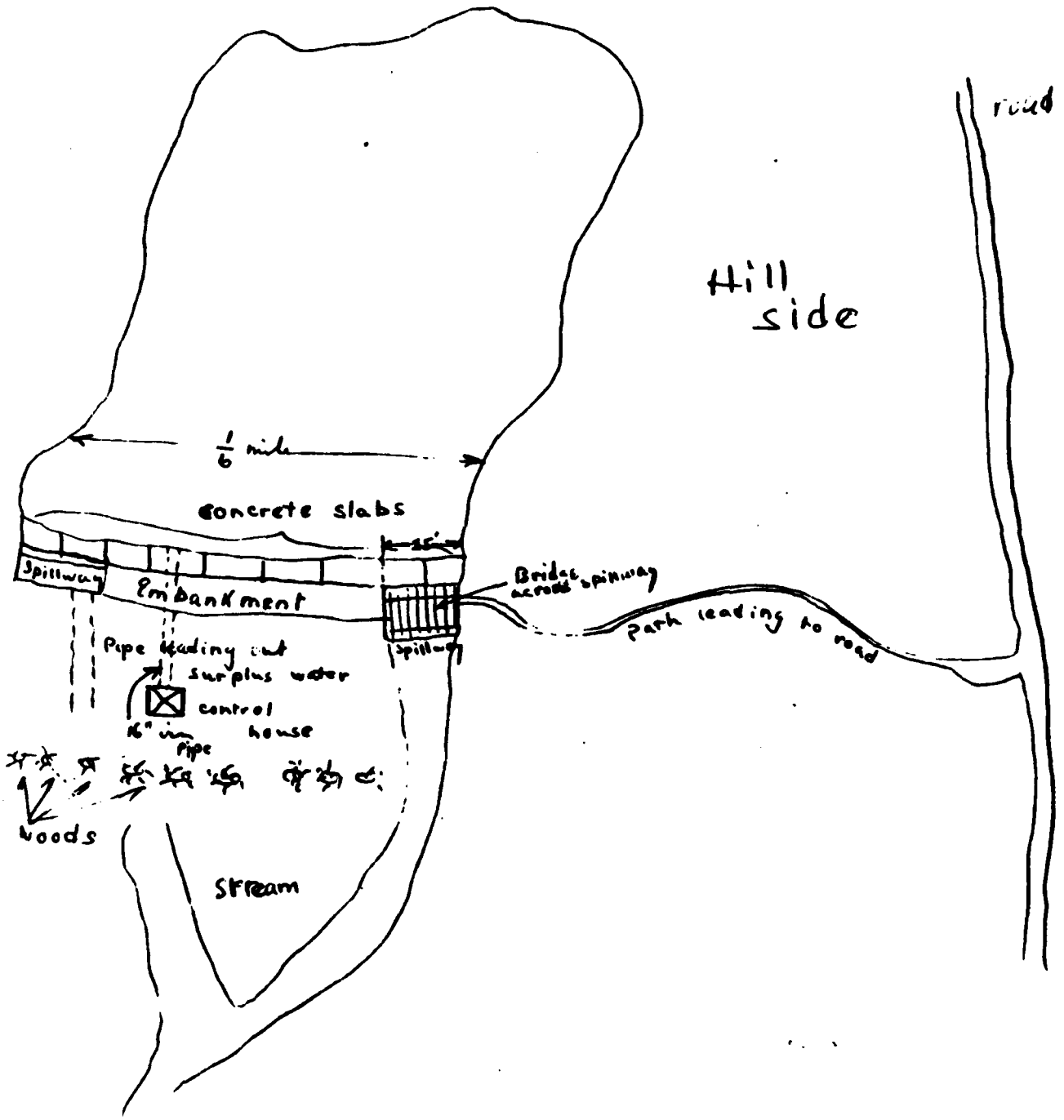
This dam is situated upon the ~~——~~ (Give name of stream) Springs Junction water in the Town of Waterville, Sangerfield County, about 4 miles (State distance) from the Village or City of Waterville. The distance down (Up or down) stream from the ~~dam~~ reservoir, to the old reservoir (Give name of nearest important stream or of a bridge) is about 1 mile (State distance).

The dam is now owned by Waterville Water Works, Waterville, N.Y. (Give name and address in full) and was built in or about the year ~~——~~, and was extensively repaired or reconstructed during the year ~~——~~.

As it now stands, the spillway portion of this dam is built of Concrete (State whether of masonry, concrete or timber) and the other portions are built of Concrete (State whether of masonry, concrete, earth or timber with or without rock fill).

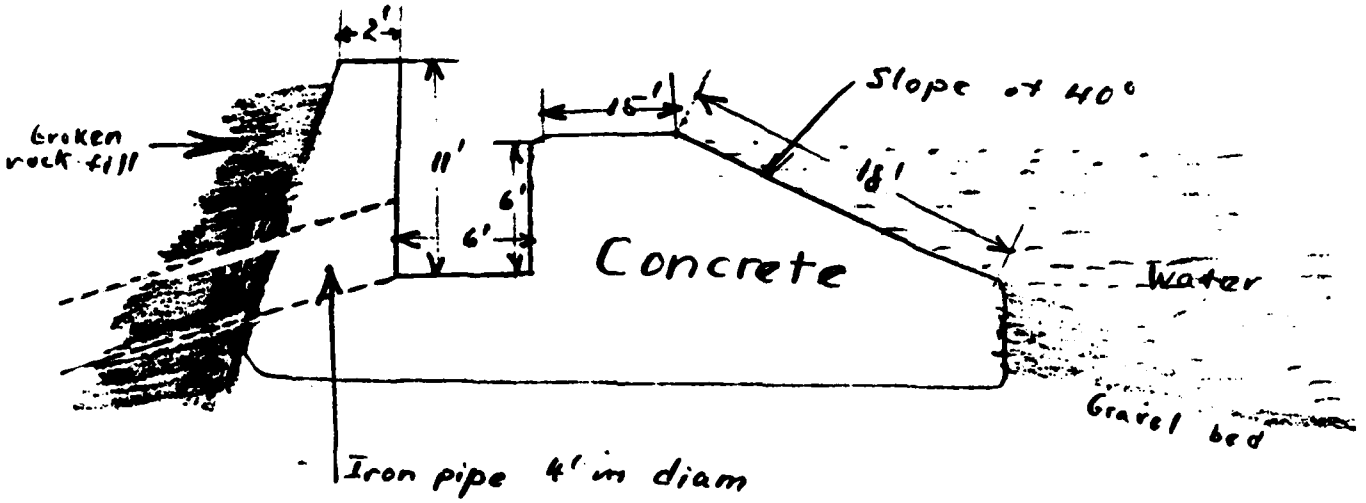
As nearly as I can learn, the character of the foundation bed under the spillway portion of the dam is gravel and under the remaining portions such foundation bed is " and earth.

[illegible] and its approximate position in relation to buildings or
[illegible]

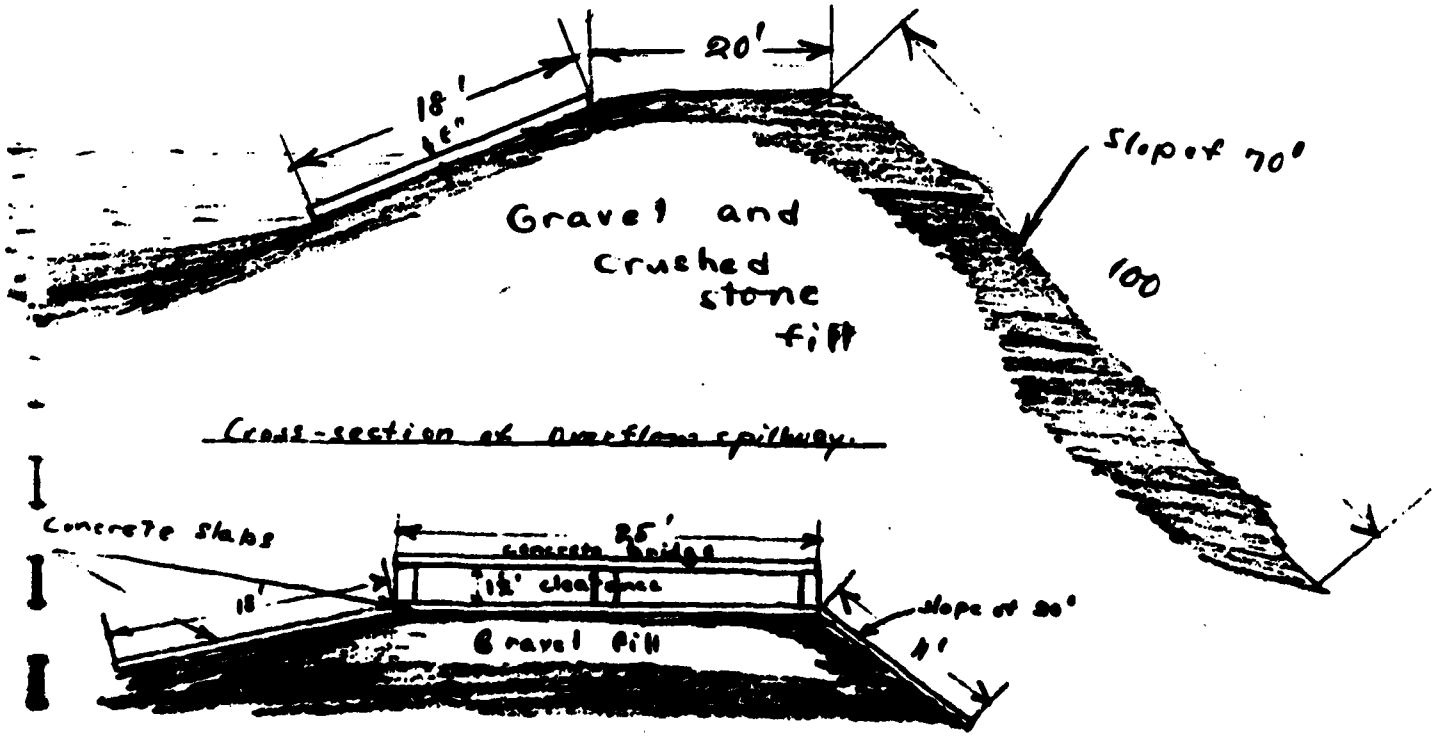


(In the space below, make one sketch showing the form and dimensions of a cross section through the spillway or waste-weir of this dam, and a second sketch showing the same information for a cross section through the other portion of the dam. Show particularly the greatest height of the dam above the stream bed, its thickness at the top, and thickness at the bottom, as nearly as you can learn.)

Cross-section of one of the spillways. (on east-side)



Cross-section of Dam-embankment.



Cross-section of overflow spillway.

50, 00, 00 yrs.

The total length of this dam is ¼ mile ~~feet~~. The spillway or waste-weir portion, is about 25' feet long, ~~and the crest of the spillway is about~~ overflow dam ~~feet below the top of the dam.~~

The number, size and location of discharge pipes, waste pipes or gates which may be used for drawing off the water from behind the dam, are as follows: There is an 16" pipe leading from the reservoir to the old one also a 4 foot pipe acting as waste pipe.

At the time of this inspection the water level above the dam was ——— ft. ——— in. ~~below~~ above the crest of the spillway. (not flowing)

(State briefly, in the space below, whether, in your judgment, this dam is in good condition, or bad condition, describing particularly any leaks or cracks which you may have observed.)

This dam is in fairly good condition. The dam part of the reservoir consists of concrete slabs laid on top of gravel. These slabs are not cemented together so that they give the water a chance to leak through the cracks.

I should suggest that these cracks be cemented or closed up in some manner.

Reported by Willard V Botsford
(Signature)

Conservation Commission, Albany, N. Y.
(Address—Street and number, P. O. Box or R. F. D. route)

Watervliet, N. Y.
(Name of place)

DEC DAM INSPECTION REPORT

WATONWAN W.S.

RB	CTY	YR. AP.	DAM NO.	INS. DATE	USE	TYPE
03	33	21	00833	12/5/1	003	2

AS BUILT INSPECTION

[1] Location of Spillway and outlet	[1] Elevations
[1] Size of Spillway and outlet	[1] Geometry of Non-overflow section

GENERAL CONDITION OF NON-OVERFLOW SECTION

[1]

[1] Settlement	[1] Cracks	[1] Deflections
[1] Joints	[2] Surface of Concrete	[1] Leakage
[1] Undermining	[1] Settlement of Embankment	[1] Crest of Dam
[1] Downstream Slope	[1] Upstream Slope	[1] Toe of Slope

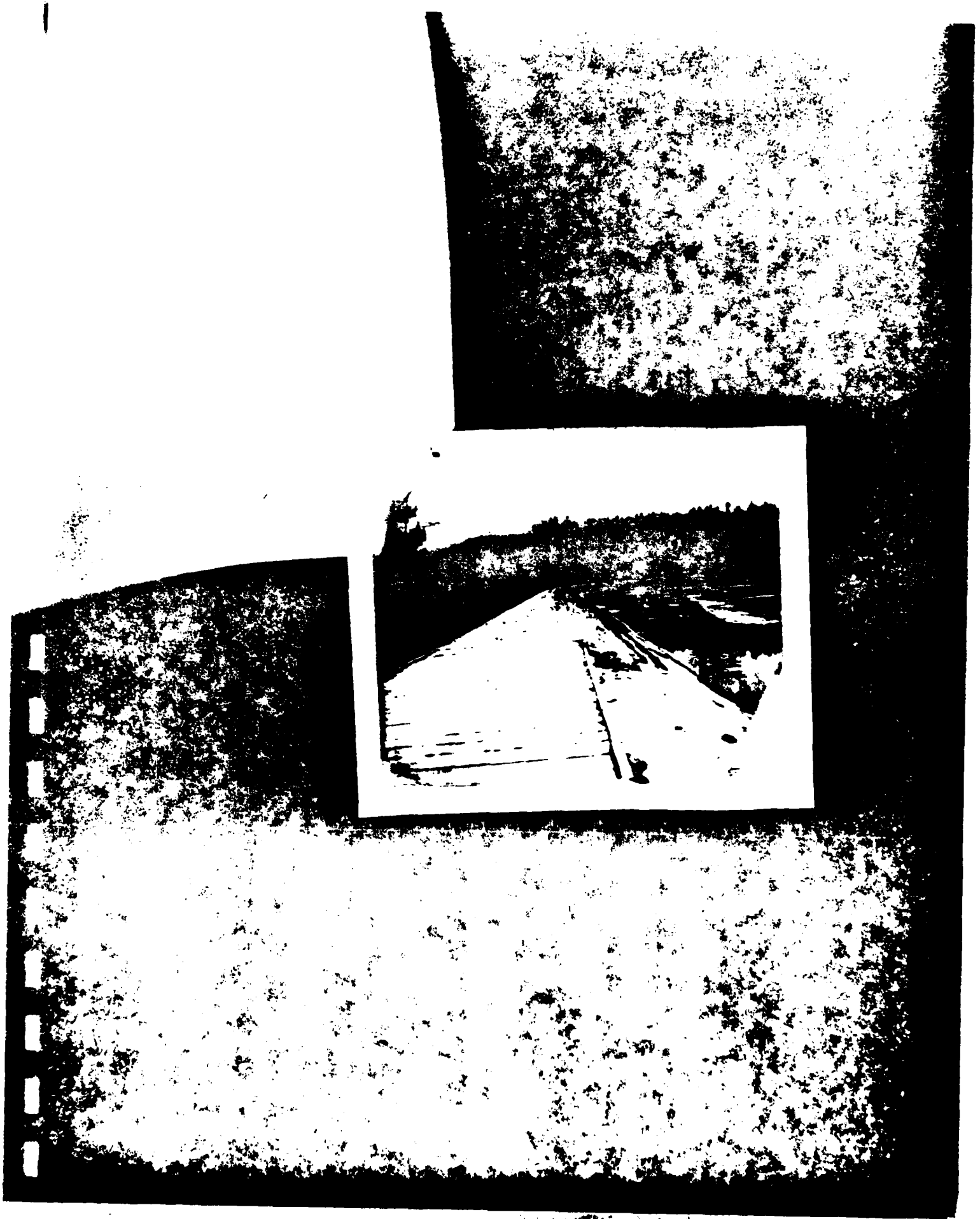
GENERAL CONDITION OF SPILLWAY AND OUTLET WORKS

[1]

[2] Auxiliary Spillway	[2] Service or Concrete Spillway	[1] Stilling Basin
[1] Joints	[2] Surface of Concrete	[1] Spillway Toe
[2] Mechanical Equipment	[1] Plunge Pool	[1] Drain

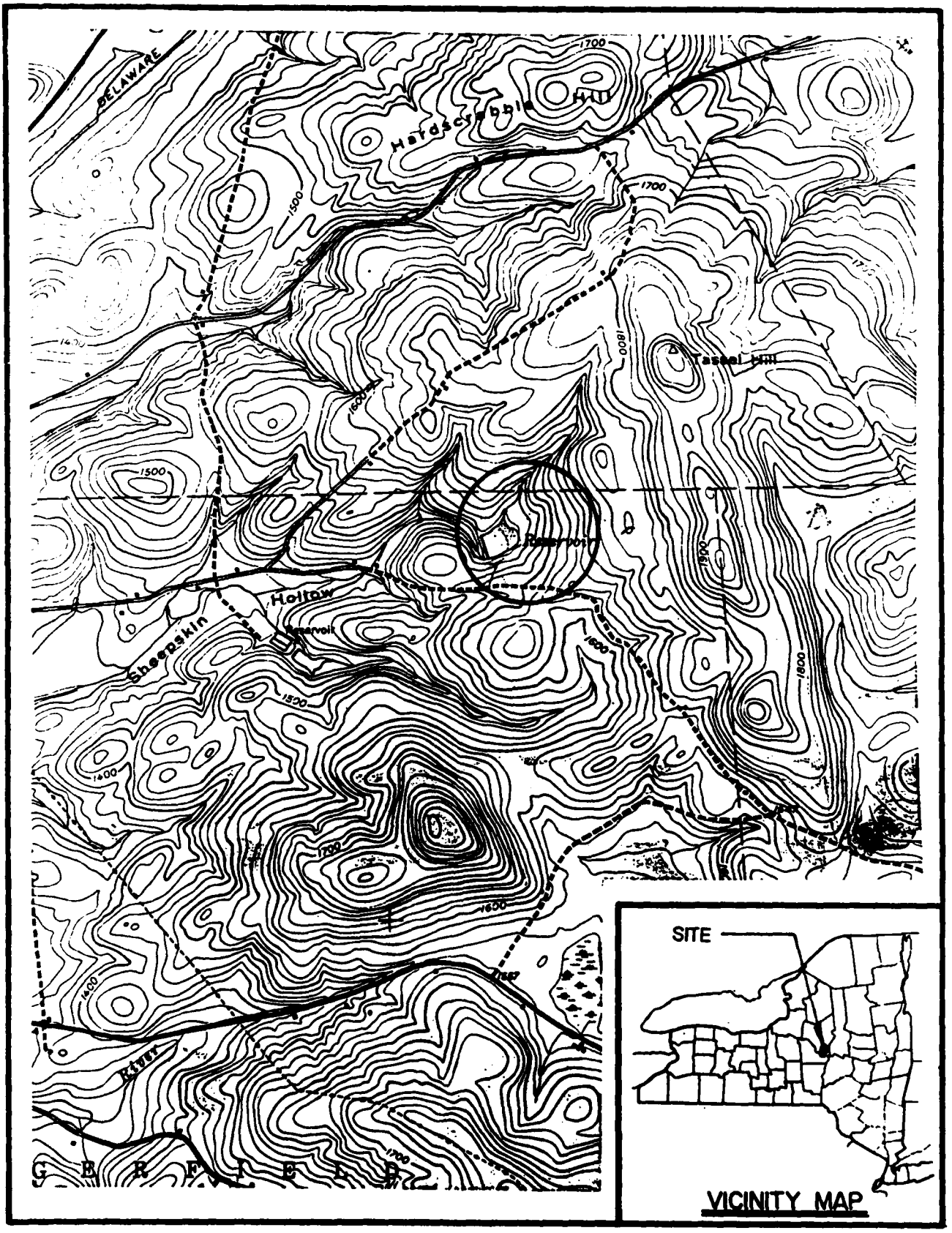
[1] Maintenance	[5] Hazard Class
[3] Evaluation	[-4] Inspector

COMMENTS:



APPENDIX F

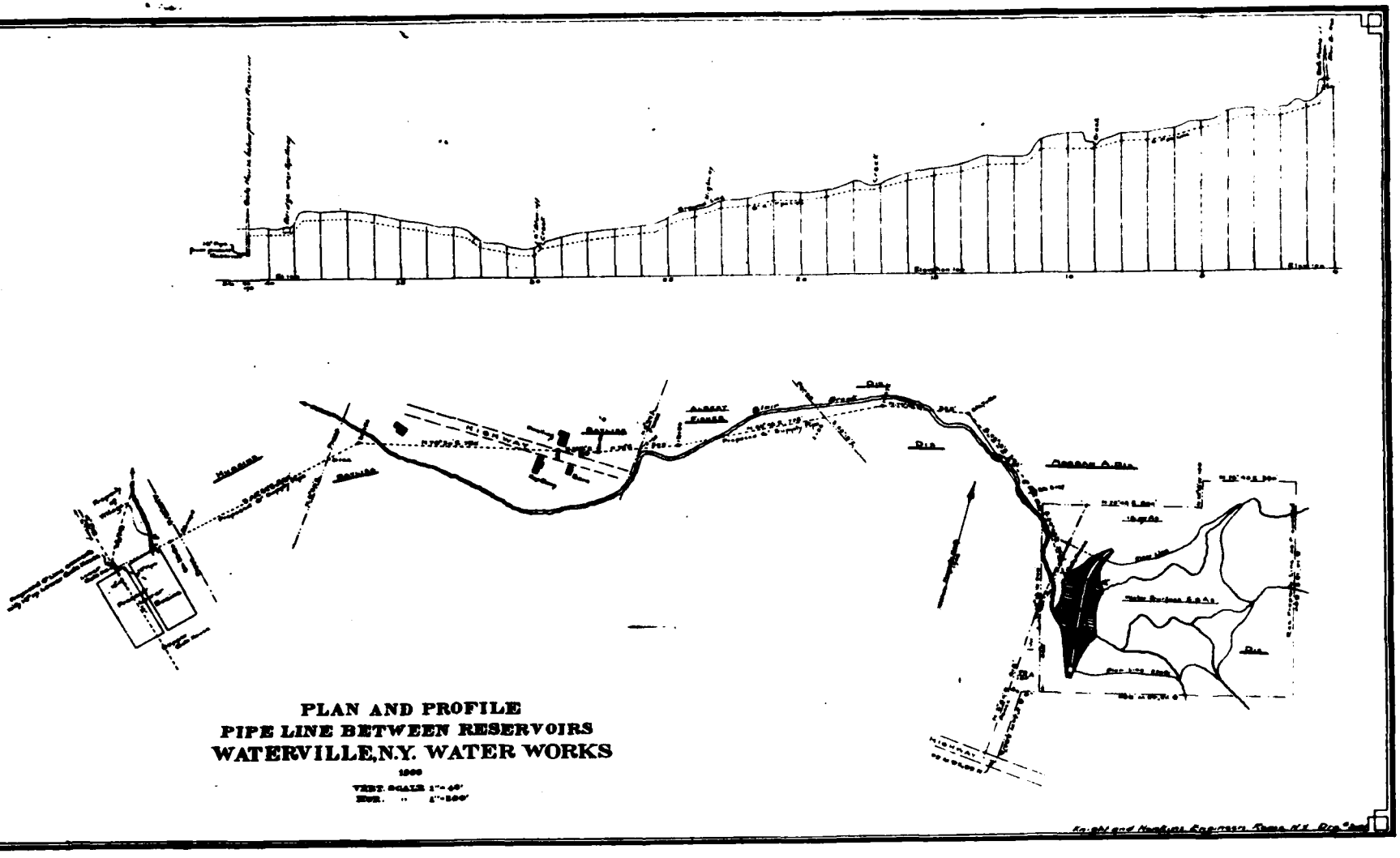
DRAWINGS



LOCATION PLAN

SCALE 1:24000

FIGURE 1



PLAN AND PROFILE
PIPE LINE BETWEEN RESERVOIRS
WATERVILLE, N.Y. WATER WORKS
1900

FIGURE 2

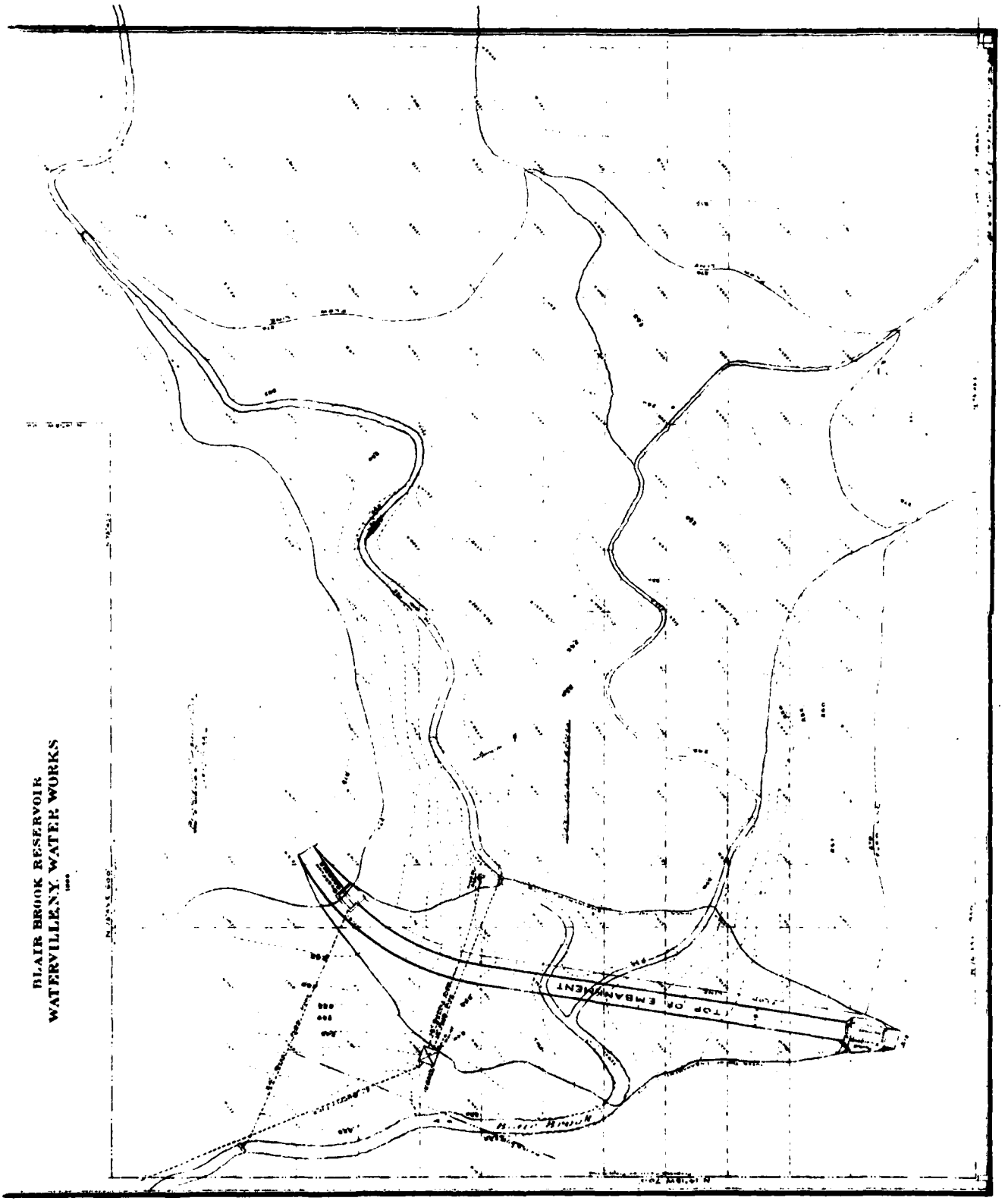

BLAIR BROOK RESERVOIR
WATERVILLE, N.Y. WATER WORKS
TOP OF EMBANKMENT

FIGURE 3

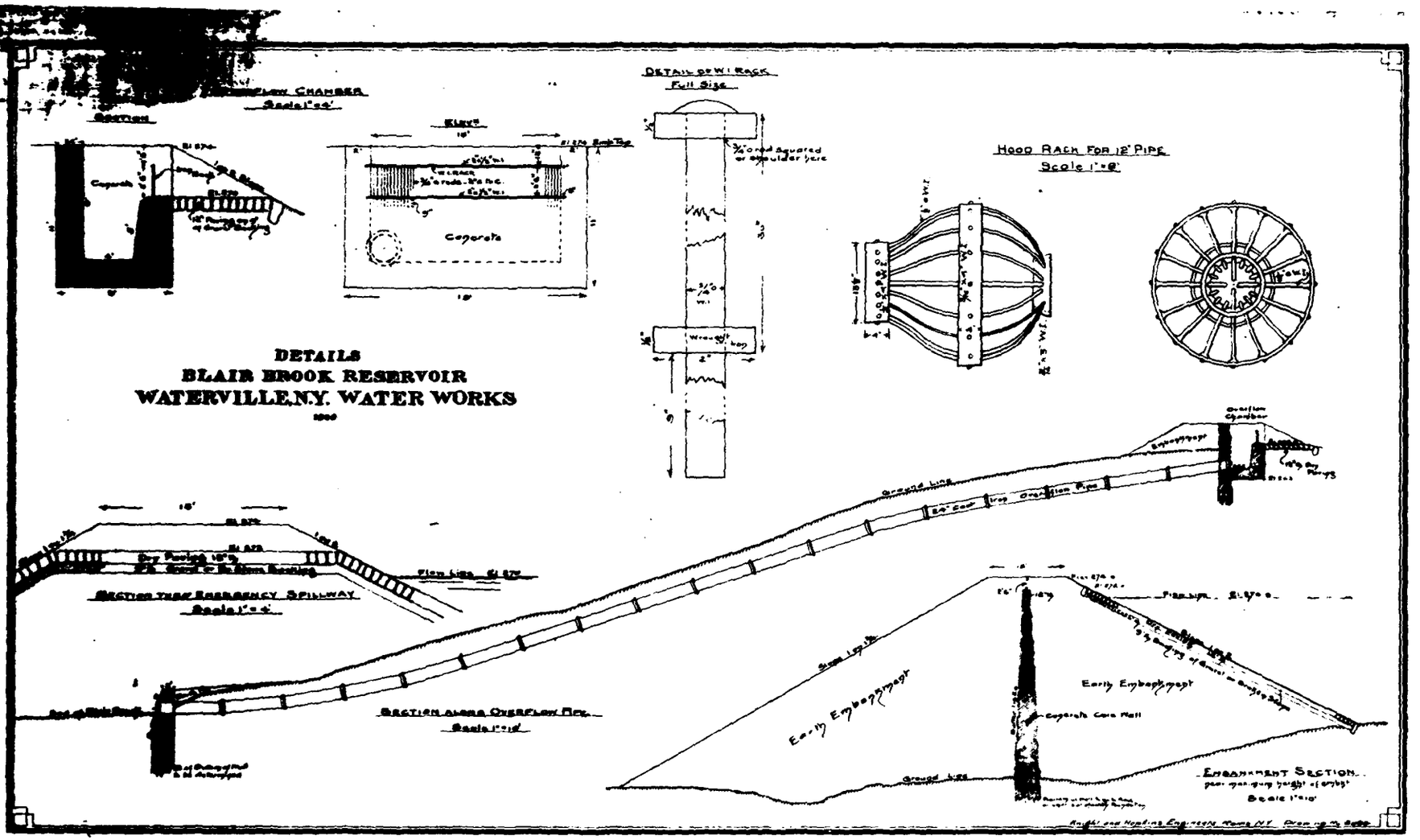

DETAILS
BLAIR BROOK RESERVOIR
WATERVILLE N.Y. WATER WORKS
1900
Hood Rack for 12" Pipe
Scale 1"=8'
Detail of Wire Rack
Full Size
Section Through Emergency Spillway
Scale 1"=4'
Section Along Overflow Pipe
Scale 1"=10'
Early Embankment
Embankment Section
Scale 1"=10'

FIGURE 4

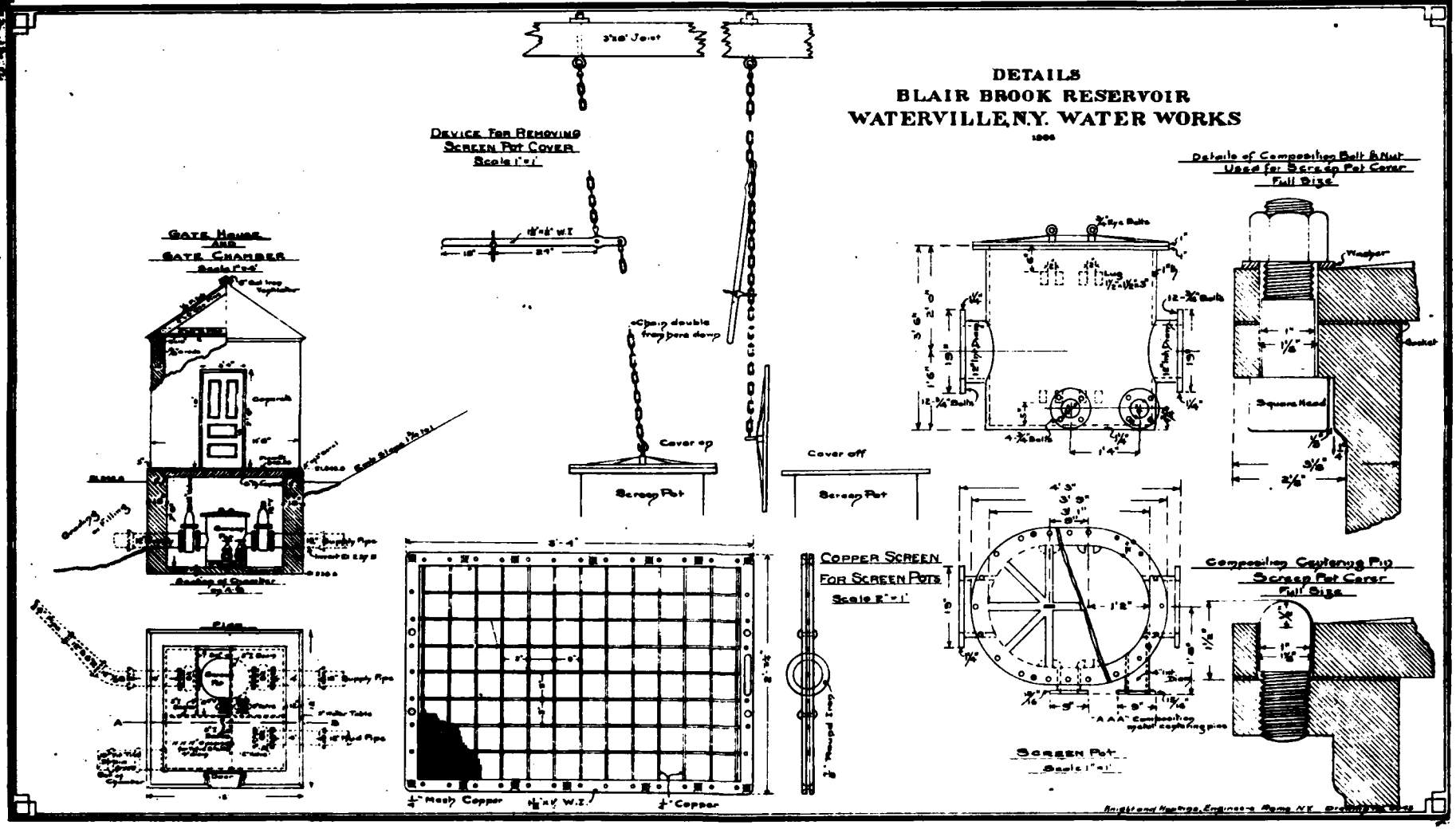

DETAILS
BLAIR BROOK RESERVOIR
WATERVILLE, N.Y. WATER WORKS
1906
Device for Removing Screen Pot Cover
Scale 1"=1'
Gate House and Gate Chamber
Scale 1"=1'
Cover on
Screen Pot
Cover off
Screen Pot
Copper Screen for Screen Pots
Scale 1"=1'
Details of Composition Bolt & Nut Used for Screen Pot Cover
Full Size
Composition Gaskets for Screen Pot Cover
Full Size
Screen Pot
Scale 1"=1'
Mesh Copper
Copper

FIGURE 5


ATE
LME